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The Meeting Room and Library of the Society are at Room 1, University Building, Washington Square, New York.

The Regular Monthly Meeting is held on the first Friday of every month, at 8 P. M. A *Conversazione* is held on the third Friday of every month, at the same hour.

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The Committee on Papers and Publications respectfully call attention to the resolutions of the Society, requiring that papers be submitted to the Committee before being read.

Members who cannot be present at the meetings, are requested to send their papers in care of the Committee who can guarantee prompt publication of all articles accepted.

Authors will be furnished, gratis, with 20 reprints of each article published in the Journal, if application for the same be made when the article is sent.

Members are requested to notify the Committee of any change of address, or failure in the delivery of the Journal. All communications relating to the Journal should be addressed in care of

A. A. BRENEMAN, 97 Water St., New York.

PROCEEDINGS OF THE AMERICAN CHEMICAL SOCIETY.

Regular Meeting, March 7th, 1884.

Vice-President Prof. A. R. LEEDS in the chair.

The minutes of the February meeting were read and approved.

The minutes of the meeting of the Board of Directors, held February 12, were read.

It was moved by Mr. Casamajor, and seconded by Mr. Stebbins, that the vote be taken on the proposed amendment to Article VIII. of the Constitution, viz.: "That 10 members shall constitute a quorum."

The amendment was carried unanimously, twenty-three members voting.

The chairman exhibited the Hoffman medal, presented to the Society by the subscribers.

The following nominations were then taken up, Messrs. Rau and Rupp acting as tellers:

	Nominated by
Dr. Antonio de Gordon y Acosto, of Havana, Cuba; care of Dr. J. J. Lewis, 42 Broadway, New York.	James H. Stebbins, Jr., Wm. Rupp, A. A. Breneman.
Harry S. Hass, Ph.B., 49 West 39th St., New York City.	C. E. Munsell, J. B. Mackintosh, Wm. Rupp.
Charles Tennant Lee, 45 Kilby St., Boston, Mass.	N. H. Darton, A. A. Breneman, T. S. Gladding.
Baron Ferdinand Van Mueller, Melbourne, Australia.	N. H. Darton, A. C. Hale, A. R. Leeds.
T. Lambert, Walpole Dye and Chemical Co., Walpole, Mass.	A. Pennisat, W. H. Nichols, T. O'Connor Sloane.
Frederick T. Walsh, Walpole Dye and Chemical Co., Walpole, Mass.	A. Pennisat, W. H. Nichols, T. O'Connor Sloane.
J. Howard Wainwright, Ph.B., 402 Washington St., New York City.	Wm. Rupp, James H. Stebbins, Jr., C. E. Munsell.
Dr. James Lewis Howe, Military Academy, Cleveland, Ohio.	T. P. Venable, James H. Stebbins, Jr., Wm. Rupp.
Vincent M. Picabia, cor. Horatio & West Sts., New York City.	P. Casamajor, James H. Stebbins, Jr., H. Endemann.
Max Schwarz, cor. Worth Street & Bowery, New York City.	H. Endemann, P. Casamajor, M. Alsberg.

All were unanimously elected.

The following were proposed for membership:

Morton Liebschütz, 345 West 34th St., N. Y. } P. Casamajor, J. H. Stebbins, Jr., William Rupp.

Edmund Banjard, 2 West 14th St., N. Y. }

The following paper was then read:

The Physical and Chemical Analysis of Flour, by A. R. Leeds.

Prof. Breneman moved that a Committee of three be appointed by the chair to decide upon a uniform system of notation and nomenclature, to be used in all publications of the Society. Amended by Mr. Stebbins, increasing the Committee to five, and carried.

Mr. Casamajor moved that an election be held to fill the position of Vice-President, and Director left vacant by the resignation of Dr. Doremus. Carried. Prof. Breneman was elected.

The meeting then adjourned.

C. E. MUNSELL,
Recording Secretary.

PAPERS UPON INDUSTRIAL CHEMISTRY.

By Albert R. Leeds.

II. THE PHYSICAL AND CHEMICAL ANALYSIS OF FLOUR.

The great attention paid during five years past in the United States to the subject of the adulteration of foods, has already resulted in a voluminous literature. Unfortunately, much of this literature is crude and erroneous, and especially that referring to the topic of the present article. Originally appearing with specious pretenses of scientific merit in certain medical journals, these misstatements have gained credence with many reputable medical practitioners. Finally, having permeated downward into the columns of the daily press and into the popular mind, they have become so firmly lodged as to make their eradication difficult.

Foremost in this direction was a paper published in Gaillard's *Medical Journal*, Jan. 1882, with the following alarming title: "Highly important and extensively advertised cereal foods under the microscope. The genuine; the spurious; the worthless and the fraudulent. Therapeutic as well as dietetic facts of great value to physicians and their patients. By Ephraim Cutter, A.M., M.D., Harvard, etc." The only means of research employed by the author of this paper was the microscope, which he styles an "unerring teacher," "an infallable detector of fraudulent claims in regard to cereal foods," etc. The results of microscopic examinations are termed analyses, and as such are expressed in *figures denoting the relative percentages of gluten and starch.* The principal feature of the article, and the one most calculated to awe and convince the popular mind, was the woodcuts with which it was profusely illustrated, and which purported to be impartial representations of what might be seen of these foods when looked at through an objective, magnifying 800 diameters. Some of these cuts or slides represent flour entirely made up of unruptured gluten cells, while specimens of other flour, quite as remarkable, but for a different reason, are represented as composed of starch cells and fibrous tissue only. The two flours which are more especially singled out, the one for unstinted praise, the other for condemnation, are the Franklin Mills Entire Wheat Flour, and the Gluten Flour of the New York Health Food Co. Besides the woodcuts which represent the former as composed almost entirely of gluten cells, the excellence of the former flour incites the microscopist to add that,

"So long as the makers maintain such a proportion of gluten cells, they confer a blessing on mankind." On the other hand, the gluten flour is stigmatized as "a meal and not a flour. The circulars are travesties, and show an ignorance which, if it did not affect human life, would be ridiculous." In all this so-called gluten flour which the microscopist examined, he states that in repeated examinations only seventy gluten cells were found.

Chemical analyses show the falsity of these statements, as I will explain later on. But even without the aid of positive knowledge, founded on analytical data, these statements should have deceived no one accustomed to the use of the microscope, as is evident from the following considerations. In the first place, in making a chemical analysis of flour as much as ten grammes should be used. The analysis of so large a quantity affords a guarantee that the figures obtained represent the average composition of a mechanical mixture of the constituents of a non-homogeneous product like flour. But the weight of flour exhibited on a microscopic slide does not exceed the $\frac{1}{100000}$th part of the quantity taken for chemical analysis, and could not fairly represent an average. Neither can one determine by counting upon one slide or upon a hundred slides, the relative number of starch cells and *unruptured* gluten cells, what is the percentage of starch and gluten. It could not be done even were the gluten cells unruptured. But in the process of grinding they are largely broken and their contents commingled with the starch. When so commingled, it is difficult even with the aid of chemical reagents to discriminate between the albuminoid and amyloid constituents of flour. To estimate their percentage amounts by counting is impossible.

So different in appearance are the various parts of one slide, and so different are various slides prepared from one and the same flour, that the use of pictures of such slides to substantiate statements as to differences in composition in the flours examined, is misleading. Lest any microscopist should regard this protest as unnecessary, since it is but insisting upon a matter with which he is already familiar, let him call to mind how successfully the public is deceived by the claim that microscopic research necessarily implies research of great scientific exactitude. In the present instance certainly, authorities in medical science were led astray. Had they but reflected for a moment, that Dr. Cutter's assertion that many of the cereal foods examined contained no gluten whatsoever, was in itself a sufficient

proof of the falsity of his statements, insomuch that there is no flour but what necessarily contains some gluten, they would not have indorsed his publications without independent examinations. But in an address delivered before the New York Medical Society, Feb. 8th, 1882, its President, Dr. A. Jacobi, says of these microscopic examinations of Dr. Cutter : "I shall refer to his statements, desiring to give them the greatest possible publicity. I wish the brief article of his would be distributed in a hundred thousand copies, reprinted in every secular paper, read from every platform and pulpit of the land. For it is time that fraud should be stopped, and a nefarious trade suppressed."

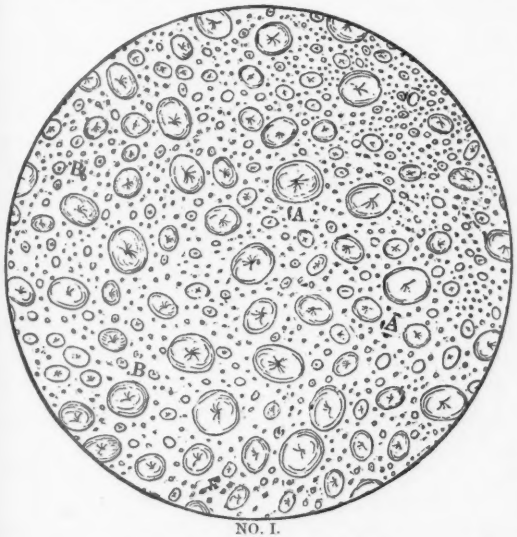
Then follows a résumé of Dr. Cutter's labors, in which without any assurance on the part of the presiding officer of a distinguished medical society, that he has submitted statements involving the reputation and business fortunes of more than two-score of the manufacturers of cereal foods in the United States to any independent critical research, he bestows indiscriminate and exaggerated commendation upon them all.

In a paper published in the Transactions of the College of Physicians of Philadelphia, III. series, VI., 377, I have given the results of the examinations of many of the foods referred to, the examinations being conducted with the aid of the microscope and mechanical manipulations, but controlled by chemical analysis. Without quoting in detail, I shall insert in this place only the table of analyses as showing how incorrect was the statement made by Dr. Cutter and approved by Dr. Jacobi, of the absence of gluten in Blair's Wheat Food, "Imperial Granum, Ridge's Food, Savory & Moore's Food, Farwell & Rhine's Gluten Flour, Hubbell's Prepared Wheat," and other cereal preparations.

ANALYSES OF HEALTH AND INFANT FOODS.

FOOD ANALYZED.	Water.	Fat.	Grape Sugar.	Cane Sugar.	Starch.	Soluble Carbohydrates.	Albuminoids.	Gum, Cellulose, etc.	Insoluble Residue.	Total.	Reaction.
Baby Sup, No. 1	5.54	1.28	2.20	11.70	61.99	14.35	9.75	7.09	.....	100.00	Neutral.
Baby Sup, No. 2	11.48	0.62	2.44	2.48	51.95	22.79	7.92	5.24	.....	100.00	Slightly alkaline.
Gerber & Co.'s Milk Food	6.78	2.21	6.06	30.50	38.48	44.76	9.56	.....	.....	101.79	Slightly acid.
Ridge's Food for Infants	9.23	0.63	2.40	2.20	77.96	5.19	9.24	.....	.....	102.25	Neutral.
Victor Baby Food	7.49	1.62	0.62	19.92	63.45	20.54	8.87	.....	.....	101.97	Slightly acid.
Anglo-Swiss Milk Food	6.54	2.72	23.29	21.40	34.55	46.43	10.26	.....	.....	100.50	Slightly acid.
Horlick's Food for Infants	3.39	0.08	34.99	12.45	none.	87.20	6.71	.....	2.62	100.00	Slightly acid.
K. & M. Infants' Food	27.95	.....	36.75	7.58	none.	71.50	none.	.....	0.55	100.00	Neutral.
Nestlé's Milk Food	4.72	1.91	6.02	32.93	40.16	44.88	8.23	.....	0.08	100.00	Slightly alkaline.
Hawley's Liebig's Food	6.60	0.61	40.57	3.44	10.97	76.54	5.38	.....	.....	100.10	Slightly acid.
Hazard's Graham Farina	9.12	0.81	2.19	2.49	69.68	6.35	8.48	5.56	.....	100.00	Neutral.
Cereal Milk	9.33	1.01	4.60	15.40	58.42	20.00	11.08	.....	.....	100.16	Slightly acid.
Mellin's Food	5.00	0.15	44.69	3.51	none.	85.44	5.95	.....	3.46	100.00	Slightly alkaline.
Blair's Prepared Wheat Food	9.85	1.56	1.75	1.71	64.80	13.69	7.16	2.94	.....	100.00	Neutral.
Savory & Moore's Infants' Food	8.34	0.40	20.41	9.08	36.36	44.83	9.63	0.44	.....	100.00	Neutral.
Hubbell's Prepared Wheat Food	7.78	0.41	7.56	4.87	67.60	14.29	10.13	undet.	.....	100.21	Neutral.
American-Swiss Milk Product Co.	5.68	6.81	5.78	36.43	30.85	45.35	10.54	0.77	.....	100.00	Acid.
Wheat Flour for Hubbell's Wheat Food	9.02	1.01	2.34	2.46	76.07	5.66	6.40	.....	.....	.....	Neutral.
Imperial Granum	5.49	1.01	trace.	trace.	78.93	3.56	10.51	0.50	.....	100.00	Neutral.
Robinson's Patent Barley	10.10	0.97	3.08	0.90	77.76	4.11	5.13	1.93	.....	100.00	Neutral.
Farwell & Rhine's Gluten Flour	12.67	0.84	2.23	1.42	68.36	7.23	10.39	0.51	.....	100.00	Neutral.

The microscopic drawings alluded to were made, it is stated, by Dr. A. T. Cuzner. Recently, in what purported to be a summary of certain information contained in a book entitled "What we Eat and What we Drink," this gentleman has published, under the title of "Food Analyses—Flour," a paper in the *Scientific-American* Supplement No. 414, in which statements are made similar to those advanced by Dr. Cutter, but nominally supported by proofs of quite different character. The fact that the microscope gives incorrect notions of the relative amounts of gluten and starch is admitted, and the attempt to make a quantitative analysis of flour by the use of this instrument is abandoned. At the same time the pictures of flour as seen under the microscope are quite different from flour as it actually appears when thus examined.

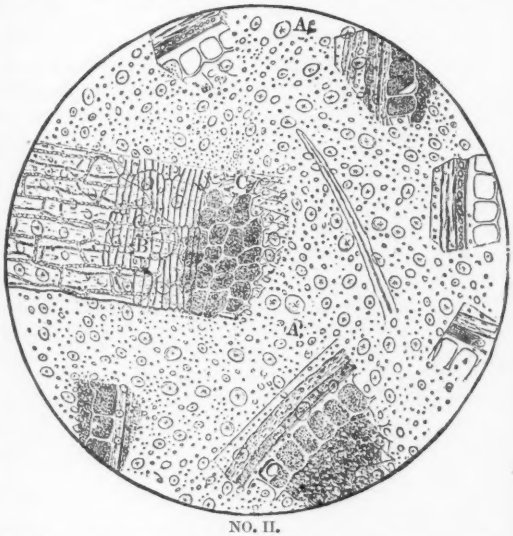


NO. I.

In the accompanying reproduction of the drawing made by Dr. Cuzner, No. 1—fig. and purporting to be a micrograph of the Pillsbury best flour, the large circles with rays or crosses at their centers, and marked A, are stated to be pictures of giant starch cells. B to stand for smaller starch cells, and C for granular gluten. Whether C is a mere dot or a very small circle without a dot in its center, is not clear from the drawing. But that the smaller starch cells are circles with dots in their centers, appears to have been certainly intended.

This drawing presumably represents the appearance in ordinary light, but in that light starch granules do not exhibit crosses, nor in any light crosses of the character depicted in the drawing. Moreover, gluten cannot be distinguished from starch in the manner stated.

The next photo-engraving No. II is a reproduction which (to quote the language of the original article) "represents the appearance of the Franklin Mills flour and equally well represents the Health Food Company's Flour, with the exception that in this flour is seen a *much larger proportion* of the bran coat with gluten cells attached, as well as unattached, together with some *hairs of wheat*, than is found in the Franklin Mills flour. In the figure, A, are seen giant starch cells; B, portion of bran coat; C, portion of bran coat with gluten cells unruptured."



NO. II.

The microscopist will be struck by the remarkable fact that this cut, which is entitled "Health food gluten flour as seen under the microscope," represents a number of thin sections of the wheat-berry. Most of these sections are transverse, and represent very beautifully the epicarp, endocarp, testa and secundine of the berry, precisely as they appear when viewed in their natural positions to one another. The largest section is a diagram illustrating the relative position of the three outer coats of the berry as viewed from without. It is a matter of nicety to prepare such excellent sections

of the berry, when it is sliced with a knife, and in the crushed fragments of the berry that remain after it has been ground into flour I had never seen anything of the character above figured. But, thinking other observers might have been more fortunate, I looked through the literature of the subject, and found precisely the same diagrams as those figured by Dr. Cuzner. In the latter case they appear in company with giant starch cells (granules?), whose magnitude is comparable with the unruptured gluten cells. In the former, they appear as illustrations of thin sections of the berry, Fig. 3 in the above cut No. III showing "the relative position of the

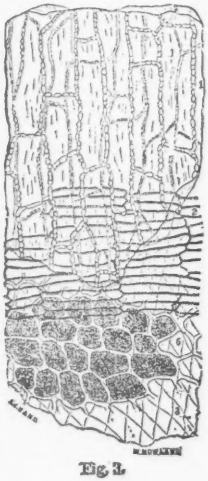


Fig. 3.

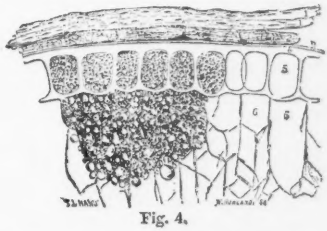


Fig. 4.

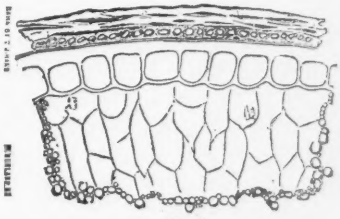


Fig. 5.

NO. III.

several layers of the investing coats of the berry, as seen from without; Fig. 4, as viewed in a section transverse to the greater length of the berry; Fig. 5, as presented in longitudinal section." In the latter case, as reproduced by Dr. Cuzner, they are portions of what he saw when Health Food Gluten Flour was examined under the microscope; in the former, they form the cut which can be found on page 4, Report on Vienna Bread, printed in 1875 at the Government Printing Office in Washington, this report having been written by E. N. Horsford, U. S. Commissioner to the Vienna International Exhibition, 1873. I have had this last cut, No. III, reproduced by photo-engraving to compare with Dr. Cuzner's No. II.

It is needless further to insist upon the worthlessness of mere microscopic inspection in determining the relative composition of flour. But after the erroneous nature of the results arrived at by Dr. Cutter by means of microscopic inspection only had been pointed out, one of his critics, Prof. J. G. Richardson, in an article entiled "A Serious Microscopic Blunder" (Phila. Med. News, June, 1882), called attention to the fact that he or any other physician, without the employment of the more exact methods of chemical analysis, could obtain sufficiently approximate results by simple manipulation of flour, to prevent them from being led astray in the matter. He says:

"Dr. Cutter asserts that the opaque, oval or rounded cells (constituting the fourth coat of the wheat grain, according to Prof. Parkes) afford most of the gluten, and hence on their presence the chief strength of the food depends." He therefore declares that a large number (fourteen) of the food-stuffs he examined, and found under his microscope to display none of these so-called "gluten-cells," "contain no gluten" (page 9), and broadly intimates that they are consequently frauds upon the public. But the fact is, these so-called "gluten cells" (denominated by Payen, *oleiferes*) probably include in their substance starch, phosphates, fatty matters and coloring materials, containing only parts, perhaps, but a small part, less than one-seventh, of the gluten which exists in wheat. Thus, Peligot, as a mean of fourteen analyses, gives the percentage of gluten in flour (whence "gluten-cells" are removed) at 12.8, while in bran (containing nearly all the "gluten cells") it is only 10.84, and other observers confirm his statements. If my friend, Dr. Cutter, or any of his disciples, would like to satisfy himself that he has made a lamentable mistake in this matter, let him take say ten grams of one of the fine flours he asserts "contain no gluten," mix it with water into a dough, let it stand for half an hour, and then stir it in a porcelain capsule, with successive portions of water, until the starch is washed away, and the adhesive fibrillated gluten is left nearly pure, in the proportion, after drying, of from seven to twelve per cent. (*Vide* Parkes' Practical Hygiene, fifth edition, 1878, p. 224.) The small starch-corpuscles and granules, left by this process entangled among the threads of gluten, can be beautifully differentiated by adding a drop of iodine solution, which affords the usual deep-blue reaction with the starch, but dyes the gluten filaments of a yellowish-brown tint."

The chemist will recognize in the above extract from Parkes' Hygiene, the result of the investigation of v. Bibra, Millon, Rivot, Ritthausen and others upon the gluten contained in cereals. The method elaborated by these chemists appears to have been adopted after the above suggestions, by Dr. Cuzner, but unfortunately with a modification which robs it at the same time of its simplicity and its value. For instead of manipulating the gluten-dough in a very small flow of water directly between the fingers (which is best), Dr. Cuzner proposes to tie it up in a muslin bag and manipulate this in a jar of water until all the starch is washed out.

His language is: "Having an occasion to make an analysis of certain flours as to the relative amount of starch and gluten they each contained, I thought that the process adopted, being simple and one easily carried out by persons of ordinary intelligence, it would interest your readers and give them the means of ascertaining for themselves the food value of any flour they might at any time be using as food in their families."

Then follows more in detail the process, which is as follows: "A certain portion (2,000 gr.) of each of these flours was mixed with water, separately from the rest, and inclosed in a piece of muslin, as we inclose a pudding. This inclosed dough was then kneaded in a certain amount of water in order to separate the starch from the rest of the flour. During this kneading process, water readily passed through the cloth to the dough, and back again to the remainder of the water, carrying with it on its return the starch cells, albumen and sugar. By continuing this kneading process, the starch, sugar, albumen and gum were finally separated from the gluten, which remained a soft, tenacious, elastic substance, insoluble in water, inside the cloth. The gluten was then removed from the inside of the cloth, moulded, dried, and weighed. The water containing the starch, gum, albumen, and sugar, was placed in a vessel and allowed to stand for some hours, in order that time might be allowed for the starch-cells to settle to the bottom.

At the end of this time the water was poured off and the starch moulded into a cake, dried, and weighed. In the examination of the Franklin Mills' and Health Food Co.'s flour, an additional process was required. During the kneading process, described above, the fine bran with adherent gluten cells was forced through the cloth and became mixed with the starch-cells in the water. This

water had to be filtered through very fine lawn muslin. The starch-cells readily passed through this cloth, but the bran was detained on the muslin, and afterward collected, dried, and weighed. As the purpose of this analysis was not to ascertain the amount of albumen, gum, and sugar contained in the flours, but rather the amount of gluten and starch, the examination was continued no further. But if the reader should desire to ascertain how much albumen, gum, and sugar a certain amount of flour contains, the following process may be adopted. Take the water poured off from the settled starch, and boil it. This will coagulate the contained albumen, which can be collected on a filter, dried, and weighed. The water that passes through the filter can afterwards be evaporated over boiling water, and the gum and sugar collected, dried, and weighed."

An entirely original and quite surprising use of pictorial illustration in connection with analysis is now given. Three rectangular blocks are depicted with sharp angles and perfectly plane sides as representing the dried gluten obtained from the three flours. They are all equally symmetrical, and distinguishable only by the fact that the Franklin Mills gluten cake is large, the Health Food Co. gluten small, and the Pillsbury gluten cake of intermediate size. The striking angularity and symmetry of these gluten blocks which appear as if cut out of steel, is puzzling. Crude gluten, as I have encountered it, is an extremely tough substance of a leather-like consistency, which, on drying, is puffed out by the imprisoned moisture in globular and more or less fantastic shapes.

Three equally symmetrical blocks also in all respects similar, except in size, represent the starch. They have a monumental character, and more closely represent grave-stones than anything in the nature of starch. Difficult as the task would be of moulding crude gluten into rectangular blocks, yet it would be easy of execution compared with that of compacting starch granules into similar masses—an achievement thus far to me quite inexplicable. Two more solid blocks represent bran, that from the Franklin Mills flour small, that from the Health Food Co. large. How bran which has been separated from both starch and gluten can be built up, compacted, dried and weighed in coherent rectangular blocks is not explained.

The author then gives his results, which I have reduced to per

cents. and supplemented with the percentages unaccounted for.

	Bran.	Gluten.	Starch.	Unaccounted for.
Pillsbury Best Flour---- ----		13.25 p. c.	80 p. c.	6.75 p. c.
Franklin Mills Flour..	2.5 p. c.	15.75 "	50 "	31.75 "
Health Food Co. Flour.	7.5 "	7.00 "	45 "	41.5 "

The absurdity of styling that an analysis, in which 30–40 per cent. of the constituents of the flour are to be put down as albumen, gum, sugar, moisture, salts, etc., is manifest.

The process was then tried on some "Pillsbury Best" flour and some Health Food Co. Whole Wheat Flour. 150 grames of each flour were taken, made into a dough, and inclosed in pieces of muslin cloth. These pieces of muslin cloth were previously washed, dried and weighed. They were then kneaded in water until the washings were no longer milky, an operation requiring many hours, when the wash-waters amounting in one case to eight, in the other to ten liters, were collected and allowed to stand. At the end of a week the precipitation of starch was still incomplete, the supernatant liquid appearing milky. The liquid was then syphoned off, great care being requisite to prevent disturbance in the easily moved starch granules at the bottom. How to get rid of the last portions of water, without losing some of the starch, and in case this were successfully accomplished, how the starch could be detached from the vessels and moulded into cakes without loss, these difficulties I saw no way of overcoming. Instead the starch was filtered off upon tared filters, and after drying at 110° in the ordinary manner, was weighed.

The gluten was detached as far as was practicable from the muslin cloth, and after drying the latter, the weight of the gluten which could not be detached was added to the weight of the main portion after drying at 110°. Great care must be exercised to obtain constant weights on drying, owing to the slowness with which the gluten gives up its last portions of moisture. If so many hours and such large amounts of water were requisite to wash the starch through ordinary muslin, the further separation of all this starch from bran by passing it a second time in a state of suspension in water through very fine lawn muslin, appeared impracticable.

The total soluble matter in the filtrates from the starch was determined, and also the crude gluten in the same. This was neces-

sary inasmuch as some of the gluten remained behind, and some passed through the muslin. Microscopic examination showed that the so-called starch contained cellular tissue and gluten, the so-called gluten contained cellulose and starch. Weighings performed on impure products of this kind of course have no real value.

PHYSICAL ANALYSES BY WASHING IN BAGS.

	Pillsbury Best.	Health Food Flour.
Starch	69.25 per cent.	52.92 per cent.
Gluten remaining in bag	3.40 "	21.41 "
Gluten in wash-waters	8.56 "	5.94 "
Soluble matters in wash-water	4.94 "	4.96 "
Water in flour	11.10 "	11.32 "
Total found	97.25 "	96.55 "
Unaccounted for	2.75 "	3.45 "

CHEMICAL ANALYSES OF SAME SPECIMENS OF FLOUR.

Starch	67.86 per cent.	65.19 per cent.
Soluble Alb.	2.84 "	2.30 "
Insoluble Alb.	8.62 "	11.21 "
Total Alb.	11.45 "	13.51 "
Sugar	2.83 "	2.67 "
Gum	5.02 "	3.84 "
Fat	1.31 "	1.63 "
Cellulose	0.81 "	2.35 "
Saline, etc	0.42 "	1.38 "
Phosphoric Acid	0.17 "	0.39 "
Water	11.10 "	11.32 "
Total	100.81	101.89 "

The result of the latter analysis coming out differently from what I anticipated, former analyses having shown that the Health Food Flour contained much the largest amount of albuminoids of any of the many samples of flour analyzed, determinations were made of two more samples of the same flour. They agree better with the former figures, although still falling short in percentage of albuminoids of the results obtained on other samples.

	Lab. No. 1,129.	Lab. No. 1,130.
Starch	58.67	58.35
Gum	2.53	undet.
Sugar	5.39	"
Soluble Albuminoids	2.35	"
Insoluble "	12.16	"
Total "	14.51	13.74
Ash	1.30	1.58
Phosphoric Acid	0.37	0.35
Cellulose	4.06	2.47

During the course of the chemical analyses detailed above, trial was made of the various methods for the analysis of flour heretofore proposed. Attempts were made to substitute direct for indirect determination of several constituents, and at the same time to effect a gain in rapidity of working and in accuracy of results. These attempts have been only in part successful. And inasmuch as the difficulties to be overcome can be best explained in connection with the trials of previous methods, the results of these trials will be stated first.

A. Cairns' Method (Quantitative Analysis, p. 255).

" Digest 5 grms. of the flour in 100 c. c. cold water for one or two hours, with frequent stirring, filter through a filter previously exhausted with hydrochloric acid, washed, dried and weighed, wash with about 100 c. c. cold water. The solution contains: (1) *albumen*, (2) *gum*, (3) *sugar* and a portion of the soluble salts. The residue contains : (4) *celluloses* (5) *starch*, *gluten* and *fat*."

" *Solution.*—1. Boil and then filter ; the precipitate consists of albumen. Dry at 100°, and weigh.

The treatment with water, filtration and precipitation of albumen should be completed on the same day. By keeping the solution hot it may be continued through two days, but this is not advisable."

[NOTE.—These are tedious operations, and of questionable accuracy. Granting that the solution of gum, soluble albumen and sugar is perfect, nevertheless, complete washing by this method is troublesome to effect.]

The precipitation of the albumen on boiling so dilute a solution is also imperfect. In an actual trial, even after concentrating the solution to one-half and boiling, only 37 per cent. of the soluble albumen was precipitated. On evaporating to 40 c. c. an additional precipitate of 52 per cent. was obtained, and to 15 c. c. a third precipitate of .4 per cent. It is not only necessary to collect these precipitates of albumen on weighed filters, but to boil down in tared beaker glasses, because the coagulated albumen attaches itself to the sides of the beaker and cannot be perfectly detached. These 3 determinations of soluble albumen required therefore 9 weighings in all, and the final result was incorrect, falling short of the correct result by 7 per cent. of the amount actually present.

The albumen so obtained should be ignited, and its amount of ash deducted.

"2. Evaporate the filtrate from the albumen nearly to dryness, add a large excess of alcohol, warm and then allow it to cool, filter on a weighed filter; wash with alcohol. Dry at 100° C, and weigh the gum thus obtained."

[NOTE.—The gum thus precipitated carries down with it some saline matters, and it should be ignited and the weight of ash deducted.]

"3. Evaporate the alcoholic filtrate from the gum to small bulk, add water, and boil out the alcohol. Concentrate the solution to 50 c. c. and divide into halves. In the first half determine the dextrose directly by copper sulphate solution. In the second half add a few drops of dilute sulphuric acid, boil, neutralize with potassium hydrate and determine dextrose as before. The excess of dextrose found in the second solution is due to cane sugar."

"*Residue.*—Wash with a jet from the wash-bottle into a beaker. Then dry the filter with what adheres to it and weigh. This weight, less that of the filter found at the beginning, gives the weight of adhering substance, which must be taken into account in the subsequent determinations."

[NOTE.—Although the amount left behind is small—in a trial only 0.0815 grm. out of an original weight of 5.3005 grm.—yet this filtration is very tedious and requires two additional weighings.]

"4. Add to the substance in the beaker 50 times its weight of water, containing one per cent. of sulphuric acid, and heat for several hours, until the starch goes into solution, and only light flocculent cellulose is left. Filter and wash until all sulphuric acid is removed, dry at 100° and weigh."

[NOTE.—All the albuminoids and starch are not carried into solution by this method, and the weight of cellulose so obtained much exceeds the true amount. The excess, as determined in one trial, was 5 times. The so-called cellulose when submitted to chemical treatment under the microscope was found to have unruptured cells, containing starch granules and undissolved albuminoid bodies.]

"5. To the filtrate from the cellulose, diluted to 400c.c., add about 30c.c. concentrated sulphuric acid, and heat on a water-bath at about 95° for several hours, adding water from time to time to keep it up to the original bulk. Digest this until a drop of the solution shows no coloration when heated with diluted iodine solution, and also gives no precipitate with alcohol. When the conversion of the starch into dextrose is complete, neutralize the excess of acid by sodium or potassium hydrate, and determine the glucose with copper sulphate as before."

[NOTE.—It has been shown by Allihn (J. pr. Chem. xxii,50), and by Salomon that the conversion effected by means of sulphuric acid is only partial, the former authority stating that under the conditions which usually prevail in starch analyses only 95 per cent. of the starch is converted into dextrose. In an experiment in which the results obtained with sulphuric acid were compared with those obtained by means of hydrochloric acid, when used according to Sachse's method (Chem. Centr. 1877, 732), to be given later, I obtained a less discrepant result. Sulphuric acid yielded 98 per cent. of the amount as determined by hydrochloric acid.]

"The starch can also be determined in a separate portion, by washing a weighed quantity with water, then with ether, and again with water, drying and then making an elementary analysis for carbon. The carbon found is from both starch and cellulose. Deduct the carbon due to cellulose found as above (formula, $C_{12}H_{10}O_{10}$ the same as that of starch), and calculate the rest to starch (44 parts carbon = 100 parts starch)."

[NOTE.—This method is tedious, difficult of execution, and inaccurate. After washing with water and ether, and drying as directed, a tough horny cake was left in the filter paper, consisting, in addition to the starch and cellulose, of the insoluble gluten, etc. The physical qualities of this mass were such that it couid not be detached from the filter. Even had it been possible to do so, the percentage of one ingredient (the starch) could not have been estimated from a carbon determination, when besides the cellulose, a mixture of at least four substances, such as are present in varying amounts in crude gluten, were undetermined.]

"*Albuminoids.*—Determine the total nitrogen in 1 grm. by combustion with soda-lime, and from this calculate the albuminoids; 15.5 parts N = 100 parts albumenoids. From this deduct the albumen found as above; the difference is gluten."

[NOTE.—It has already been shown that the percentage of albumen found as above, is only a fraction of the amount actually present. The ratio of 15.5 : 100, gives for the nitrogen multiplier 6.45. This is certainly too high. Ritthausen concluded from the results of his elaborate analyses of the wheat albuminoids, that the correct multiplier is 6. Others place it at 6.33, and this number has been employed in making the calculations contained in the present article, except where otherwise stated.]

"*Fat.*—Weigh out 2 or 3 grms. treat with ether, boiling it gently over the water-bath, decant the ether through a filter into a weighed dish, repeat this two or three times, evaporate off the ether, and weigh the fat."

[NOTE.—This method of fat extraction gives results much too low. As thus determined, the Pillsbury flour contained only 1.02 per cent. of fat. When the treatment with ether was continued until no more fat could be extracted, the sample of flour (undried) yielded 1.35 per cent. of fat; dried, it yielded 1.31 per cent. These latter results are in accordance with those stated by König (Nahrungsmittel, p. 559), who recommends that the extraction with ether should be performed on the dried substance rather than on the undried, the latter method usually yielding the higher results. This he attributes, not so much to a decomposition and alteration of the fat, but to a solution in water-holding ether of substances other than fat—such as resin, wax, chlorophyll, etc.]

"*Ash.*—Burn 40 or 50 grms. of the flour in a weighed dish. If there is any difficulty in burning off the carbon, cool and weigh the dish and contents; then extract with hot water, filter through a small filter, avoiding any transfer of the carbonaceous substance to the filter. Dry the dish, and weigh again. The loss represents mineral salts dissolved out. Moisten with nitric acid, add the filter-paper and contents, burn again, cool, and weigh. The weight, less that of the dish, represents the remainder of the ash. The weight of the ash of the small filter-paper may be ignored. The ash may be dissolved in water with a little nitric acid, and analyzed as required."

[NOTE.—This amount of flour appears enormously greater than needed, except it be desired to make an extended analysis of the ash. In an actual trial 22.9435 grm. flour was taken, and burned in a platinum capsule, with a small flame placed somewhat to one side of the dish. The platinum was raised to a red heat only, and contact of a current of heated air with the carbonized mass was favored by this disposition of the flame. At the end of 8 hours I was surprised to find that the ash was burned perfectly, no carbon remaining.]

An accurate method is given by König (Nahrungs- und Genussmittel, p. 316 & 561). Ten to twenty grammes of the flour is burned, at first over a small flame, until a black coal remains, and no more smoke is given off. Then the flame is removed, the coal pulverized, and allowed to stand for some hours in the air. On now strongly igniting, a very white ash is quickly obtained, or, if necessary, the exposure to air and ignition may be repeated. This gives the raw ash, which may contain coal, sand, and carbonic anhydride, and is not to be set down as the pure ash or "ash."

To correct for carbonic anhydride, the entire raw ash (from 10 to 20 grms. of substance) is dissolved by hydrochloric acid in a CO_2 apparatus, and its amount subtracted.

The solution so obtained is filtered upon a dried tared filter, repeatedly washed with hot HCl, then with hot Na_2CO_3 and NaHO, in order to remove separated silica, then again with hot water, dried at 100 to 110°, and weighed. This residue of coal and sand is then to be deducted from the raw ash.

König says truly that CO_2 in the ash of pure cereals is too inconsiderable to necessitate a correction for it. If the ash does evolve notable CO_2, it indicates an addition of chalk, magnesite, etc.

In nice questions, involving falsifications of the flour, the above method is advisable. But for ordinary determinations a very simple and rapid method, which is given later, will be found accurate.

(*To be continued.*)

ABSTRACTS.

GENERAL AND INORGANIC CHEMISTRY.

The Decomposition of Ammonia by Heat. W. RAMSAY and S. YOUNG.

The object of the researches was especially to determine with accuracy the temperature of dissociation, and the influence of the material of the vessel in which the decomposition is effected. The ammonia gas was obtained from concentrated solution of ammonia and after passing through three tubes containing lime was carried into the decomposition tube which was heated by a Fletcher furnace. The temperature of the furnace was ascertained by the use of salts fusing at known temperatures. The gases escaping from the heated tube were passed first into standard sulphuric acid and the gases unabsorbed (H & N) were collected and measured.

Tubes of porcelain, iron and glass were used, and in some cases filled with fragments of other substances, as asbestos, cardboard, copper wire or spongy copper, broken porcelain, etc. The results show that decomposition begins at a little below 500° C, under the most favorable conditions, but in contact with glass only, at much higher temperatures. The amount of decomposition depends upon time of heating and extent of surface. Under pressure in sealed glass tubes the results were less decisive, as it was difficult to prevent bursting of the tubes. In one case a tube was maintained at 780°, or a little lower, for six hours without appreciable decomposition of NH_3. Recombinations of dissociated gases has been shown to occur to a very minute extent. (*J. Ch. Soc.* CCLVI., 89). A. A. B.

History of the Ammonio-Silver Compounds. S. A. REICHLER. (*Ber. d. ch. Ges.* 1884. 41.) J. H. S., Jr.

On the Validity of the Clausius-Williams on Hypothesis. Examination of a few of Dr. Hans Jahn's Objections. By SVANTE ARRHENIUS. (*Ber. d. ch. Ges.* 1884. 49.) J. H. S., Jr.

On the Numerical laws of the Solid State. P. SABATIER. (*Bul. Soc. Chim.* XLI. 166.) E. W.

On the Fluorides of Sodium. M. GUNTZ.

From a study of the thermal phenomena of solution of NaF and of NaF,HF, the conclusion is reached that hydrofluoric acid is a bibasic acid like sulphuric and not monobasic like hydrochloric. (*Bul. Soc. Chim.* XLI. 168.) E. W.

Thermo-chemistry—Heat of Formation of Fluorides. M. BERTHELOT.

This is an answer to Tommassi's paper given above. The author says that Tommassi is mistaken as to the importance of his publications. He has not made any experiments, nor has he published any original idea. He has only appropriated laws that have been known for thirty years, the laws of Andrews and of Favre and Silbermann, or law of *modules*. This law itself belongs to a by-gone period; it is not accurate and it is useless to substitute approximate values for the precise numbers found experimentally by Thomsen and by Berthelot himself.

Besides, the law of *modules* does not give the initial number 98.5; this number is obtained by adding the oxidation heat of the metal(=82.3 for potassium, obtained by experiment) to the heat of neutralization of its oxide (=16.2, obtained by experiment.) (*Comptes Rend.* XCVIII. 61.) P. C.

On the Heat of Combination of Soluble Fluorides. D. TOMMASSI.

The heat of combination of these, as found by Guntz, confirm the law enunciated by Tommassi.

	Heat Units of Combination.	
	Found.	Calculated.
Potassium fluoride	98.4	98.5
Ammonium fluoride	36.2	35.9
	70.7	70.4

[M. de Forcrand has already stated (Comptes Rendus March 26, 1883) that this is the law of Andrews, published in 1842.) (*Comptes Rend.* XCVIII. 44.] P. C.

On the Synthesis of Compounds Possessing of a Molecular Rotatory Power. E. JUNGFLEISCH.

Contesting the view of M. Pasteur, that the synthesis of bodies possessed of rotatory power has not yet been accomplished. (*Bul. Soc. Chim.* XLI. 226). E. W.

On the Speed of the Dissociation of Brass. R. B. WARDER.

When brass is heated in a current of hydrogen, the rate at which zinc is volatilized diminishes more rapidly than the whole quantity of zinc present. Whatever may be the relation between the rate of loss and the quantity of zinc at the surface, the rate of loss as a whole is believed to be modified by the slowness with which zinc diffuses from the interior to the surface of the mass. (*Chem. News*, XLIX, 73). A. A. B.

Phenomena of Dissociation.—M. ISAMBERT. A mathematical paper, being a discussion of Berthelot's formula:

$$Q_T = Qt + u - v.$$

Q_T and Qt being heats of combination at the temperatures T and t, and u — v, difference of heats absorbed in passing from t to T. (*Comptes Rend.* XCVIII, 97.) P. C.

On the Behaviour of Carbonic Oxide with Air and Moist Phosphorus. IRA REMSEN and E. H. KEISER.

On passing purified air through an apparatus specially constructed for this purpose (all organic matter being excluded), the authors still obtained a precipitate of barium carbonate in the last wash bottle, and, therefore, came to the conclusion that the formation of carbon dioxide could only be due to the presence of carbon in the phosphorus.

In order to see whether carbonic oxide on being passed over moist phosphorus would form carbon dioxide, they passed a stream of air mixed with carefully purified carbonic oxide through the apparatus; the precipitate of barium carbonate was no greater than with pure air. The authors therefore came to the conclusion that carbonic oxide is not oxidized in contact with air and most phosphorus. (*Ber. d. ch. Ges.* 1884. 83). J. H. S. JR.

On Hyponitrites. E. DIVERS and M. KAWAKITA.

After alluding to the discovery of the hyponitrites by Divers in 1871, the authors maintain the validity of the formula AgNO first given by Divers, and discuss the results of Berthelot and Ogier, which have led these observers to adopt the formula $Ag_4N_4O_5$. The per cent. of Ag obtained by the latter is shown to be

too low, and to have resulted from presence of nitrate or nitrite, produced by oxidation, and to imperfect washing of the salt. Using boiled water for washing, the authors obtained a product considerably richer in silver, and by repeated solution and precipitation in an atmosphere, of CO_2, they finally obtained a salt with 77.06—77.13% of Ag, which accords more closely with the formula AgNO than with any other. In preparing the alkaline hyponitrite as a preliminary step, the original method of Divers, viz., reduction of the alkaline nitrite or nitrate in solution by sodium or potassium amalgams is preferred to the methods of Zorn or Menke. (*J. Ch. Soc.* CCLV., 78). A. A. B.

New Sulphur Salts Derived from Phosphorus Ter-Sulphide. G. Lemoine.

Starting from phosphorus sesquisulphide, the author has obtained salts, which may be supposed to be derived from the action of $P O S_5$ on H O. (Old style.)

Analogous compounds are also derived from phosphorus ter-sulphide $P S^3$. (Old style.) (*Comptes Rend.* XCVIII. 45.) P. C.

Silicated Chloride of Manganese. M. Al Gorgen.

Obtained by heating at a low red heat. 20 grammes of manganic chloride and 1 gr. of precipitated silica, and passing a current of hydrogen and steam. There is formed a button, which is a mixture of rhodonite, tephroite and the silicated chloride which the author has studied.

The button is treated with concentrated alcohol, which dissolves all the chloride. The residue is made of the two silicates which are bi-refracting and form large laminae, not acting on polarized light. These are formed from the silicated chloride. Their composition is

$$Si\ O^4\ Mn^{11}\ (Mn\ Cl)^{12}$$

A silicated bromide of manganese is obtained by analagous processes. A silicated iodide is more diffiult to obtain. (*Comptes Rend.* XCVIII. 107.) P. C.

The Halogen Compounds of Selenium. F. P. Evans and W. Ramsay.

From their experiments the authors are led to believe that selenium monochloride splits up on heating into Se and Cl. There is

no indication of the existence of a dichloride. The tetrachloride does not decompose below 200° C., but at high temperatures breaks up rapidly according to the equation $2\ SeCl_4 = Se_2 + 4\ Cl_2$, yielding eight volumes of Cl from four of $SeCl_4$. 50% of substance is decomposed at 288°, and 65.74% at 350°. Details in regard to the effect of heat upon selenium chlorobromide are also given together with a table of the corresponding halogen compounds of sulphur and selenium. (*J. Ch. Soc.* CCLV., 62). A. A. B.

An Experimental Investigation on the Value of Ferrous Sulphate as a Manure for Certain Crops. (Concluded in following number.) A. B. GRIFFITHS.

The treatment was found to increase the weight of beans as compared with a plot of land untreated and planted with the same crop. The proportion of iron and phosphoric acid in the ash of the stalks and leaves was increased to a marked extent, but the composition of the seeds was little affected. (*J. Ch. Soc.* CCLV. 71). A. A. B.

On a New Method of Preparing Barium Permanganate. G. ROUSSEAU and B. BRUNEAU.

To a cold saturated solution of potassium permanganate (100 gms. in 1500 to 1600 gms. water) are added 300cc. of hydrofluosilicic acid of 30° B. The mixture is allowed to stand for some time, then filtered through asbestos, and then neutralized by milk of baryta in quantity sufficient to about neutralize the amount of hydrodfluosilicic acid originally used. Barium carbonate will not serve here, as it will precipitate the whole of the manganese as hydrated peroxide. The solution is allowed to settle, decanted, and evaporated. By re-dissolving and again evaporating a pure product is obtained. (*Bul. Soc. Chim.*, XLI. 246). E. W.

Zinc in Drinking-water. C. W. HEATON.

Spring water, originally free from zinc, was found to contain 6.41 grains of $ZnCO_3$ per gallon, after flowing half a mile through a galvanized iron pipe. (*Chem. News*, XLIX, 85). A. A. B.

Russian Chemical Society. Correspondence of M. O. Davidoff.

M. Wilne in separating the base metals of platinum ore by BaCo has found a compound the reactions of which differ from those of

compounds of known elements. He desires to preserve the right to continue his researches.

M. Alexieff presented results of a thermochemical examination of the effects of mixing solutions of different substances.

M. Sturm has studied the changes in concentration of solutions filtered through a mixture of pulverized quartz, $CaCO_3$ $CaSO_4$ and stilbite.

M. Kouznetzoff's analysis of Rotschoubeite from the Yougine mine was presented.

SiO_2	32.43	FeO	1.63
Cr_2O_3	5.32	CaO	0.32
Al_2O_3	12.20	MgO	34.11
Fe_2O_3	0.50	H_2O	14.42

Bul. Soc. Chim., XLI., 253. E. W.

Preparation of Chromic Sulphate.—H. BAUBIGNY.

Cr_2O_3 is precipitated from potassium dichromate by treatment with hydrogen sulphide, and thoroughly washed. The chromic oxide is dissolved in a minimum quantity of nitric acid and by the action of heat, the violet salt is obtained. A slight excess of sulphuric acid is added and by means of alcohol the violet sulphate is thrown down. This salt is filtered rapidly, dissolved in weak sulphuric acid, re-precipitated by alcohol and purified by two solutions in water and two precipitations by alcohol. After every precipitation the sulphate is dried in a centrifugal.

The sulphate may also be prepared from chlorochromic acid, by reducing with alcohol. The violet sulphate is obtained by proceeding as above, after adding sulphuric acid diluted with 2 or 3 times its volume of water. (*Comptes Rend.* XCVIII. 100.) P. C.

Preparation of Large Quantities of Attenuated Cultivations of Anthrax Virus. A. CHAUVEAU.

The object is to prepare sufficiently large quantities to vaccinate 8,000 sheep.

There are two series of operations.

A drop of infected blood is taken from a guinea pig and introduced into a flask containing 20 c. c. of sterilized broth. The culti-

vation is carried on for 10 hours at a temperature of 43° C. The cultivation liquid is afterward heated to 47° C.

The second series of operations is carried on in flasks of 1 litre to 2 litres, according as there are 4,000 or 8,000 sheep to be vaccinated.

These flasks are Wollf's bottles with three tubulures, nearly filled with the cultivation liquid. The middle tubulure has in it a tube drawn to a narrower portion at the lower end and provided with a cotton plug. By this tube the air enters and bubbles through the liquid, keeping it in motion. One of the other tubulures communicates with an aspirator, while the third is provided with a fine tube to empty the flask. This last tube also serves for introducing the organism to be cultivated; 1 drop of previous cultivation to be introduced for every 10 c. c. of liquid.

This apparatus is kept at 35°–37 C, and the cultivation would take place very slowly if the liquid were not stirred by the continual passage of air through the liquid, which causes a profuse production of organisms.

Chicken broth (1 part of lean meat to 4 or 5 parts of water) has given the best results as a cultivating liquid. (*Comptes Rend.* XCVIII. 73.) P. C.

Antiseptics and Bacteria. P. Miguel.

An article published in "Annuaire de Météorlogie," for 1884. From a table there given the following data are taken. The quantities represent the weights in grammes of antiseptics, which prevent the putrefaction of 1 litre of neutralized beef broth.

	Gr.
Mercuric iodide	0.025
Silver iodide	0.030
Hydrogen peroxide	0.050
Mercuric chloride	0.070
Silver nitrate	0.080
Osmic acid	0.15
Chromic acid	0.20
Chlorine	0.25
Iodine	0.25
Auric chloride	0.25
Platinic Chloride	0.30
Hydrocyanic acid	0.40

Bromine	0.60
Cupric chloride	0.70
Chloroform	0.80
Cupric sulphate	0.90
Salicylic acid	1.00
Benzoic acid	1.10
Potassium cyanide	1.20
Aluminic chloride	1.40
Zinc chloride	1.90
Sulphuric, nitric, hydrochloric and phosphoric acids	2.00 to 3.00
Carbolic acid	3.00
Alum	4.50
Tannin	4.80
Arsenious acid	6.00
Boracic acid	7.00
Ethylic alcohol	95.00
Sodium hyphosulphite	275.00

"This list will cause surprise in many quarters. The only criticism permissible is to repeat the experiments of M. Miguel."

Mention is made of the fact that naphthalene is powerless as an antiseptic when purified from phenol and other bodies. Even when present in such quantities that the beef broth is filled with solid pieces, the development of bacteria is not prevented. (*Mon. Scientifique.* 3. XIV. 170.) P. C.

ORGANIC CHEMISTRY.

Contributions Towards a Knowledge of the Indulines O. N. WITT.

The indulines belong to a class of bodies, which are produced in many reactions, and depend usually upon the occurrence of some secondary reaction. Their formation and constitution is therefore, still obscure.

In the ordinary formation of induline from amidoazobenzole and aniline, the presence of ammonia is always observed. Besides the formation of the typical induline $C_{18}H_{15}N_3$, the author has observed the presence of a series of more complicated byproducts

If phenylated amidoazobenzole be used, the reaction takes a different shape. If phenylamidoazobenzole and aniline chloride are heated together, no ammonia is formed, and the product obtained is free from complex byproducts.

As phenylamidoazobenzole and induline are isomeric, it seemed probable that, under the influence of aniline chloride, a molecular change might take place. This idea, however, was found to be untenable. If Tropaeoline O. O. is substituted for phenylamidoazobenzole, however, in this case, the addition of aniline chloride is not even necessary. The aniline salt of this acid (Tropaeoline O. O.), heated with an excess of aniline, forms induline, and regenerates sulphuric acid. A reduction and splitting up of the azo-group has taken place, the hydrogen required being derived from the aniline present, and this, on combining with the amidodiphenylamine produced during the reduction, forms induline.

The higher homologues of phenylamidoazobenzole, behave in the same way.

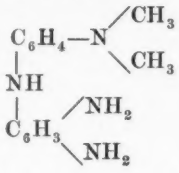
Diazoparatoluole and diphenylamine, form a compound crystallizing in yellow leaflets, melting point 109—110° C, and soluble in strong sulphuric acid with a green color.

The corresponding derivative of 1 : 2 : 4 metaxylidine forms golden yellow crystals, melting point 142—143° C.

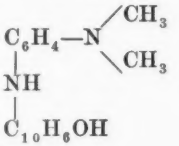
By substituting other secondary amines for diphenylamins, amidoazo-compounds are formed, which, under the action of salts of primary aromatic bases, form a whole series of induline dye-stuffs. (*Ber. d. ch. Ges.* 1884. 74.) J. H. S., JR.

On Indophenoles. O. N. Witt.

In the beginning of this year, Nietzki published a paper on the examination of saffranins, in which he described the constitution of dimethylaniline green, and toluylene blue, or at least its leuko-base. From these data the constitution of leukindophenole was established. Thus, if toluylene white has the following constitution :



Leukindophenole must be constituted as follows :



(*Ber. d. ch. Ges.* 1884. 76.) J. H. S., Jr.

On Orthoamidoazo-Compounds. Emilio Nölting and O. N. Witt.

It has until recently been assumed that by acting with diazo-compounds upon amines or phenoles, that amido- or oxyazo-compounds could only be formed when such amine, or phenole, had its para-position unoccupied.

The authors find that the above hypothesis does not hold true, as they have succeeded in producing amido-azo-compounds, in which the —N=N— groups stand in the ortho-position.

Starting from para-toluidine, they produced first diazoamidoparatoluole, and this was converted into amidoazoparatoluole, which appears as beautiful, orange-red, lustrous needles, easily soluble in alcohol and acetic ether. Melting point 118.5° C. Reducing agents split up this new compound into paratoluidine and orthotoluylendiamine. (*Ber. d. ch. Ges.* 1884. 77). J. H. S., Jr.

On the Lutidine of Coal Tar. M. Oechsner de Coninck

The fraction boiling at 153°.5 to 154°.5 constituted the base,

C_7H_9N. Specific gravity 0.9443, vapor density determined by Meyer's apparatus 3.6 to 3.9, colorless Mobile liquid, with an acrid and penetrating odor, quite distinct from that of pyridine. The fumes provoke violent headache. The chloro platinate was examined and found to agree in composition with that demanded by theory. It combines very slowly with ethyl iodide. The conclusion of the author that the lutidine of coal tar is an ethyl pyridine while picoline is a methylpyridine, is regarded as confirmed.

The most marked character of this lutidine is its perfect miscibility with water in all proportions.

By oxidation with potassium permanganate, an acid melting at 308° and exhibiting the other properties of isonicotricic acid was obtained. (*Bul. Soc. Chim.*, XLI. 249). E. W.

Theoretical Considerations on Isomerism in the Pyridine Series. MM. OECHSNER DE CONINCK and J. C. ESSNER.

Facts are cited tending to indicate that pyridine instead of being a monosubstituted benzine constitutes in itself a special group. (*Bul. Soc. Chim.* XLI. 175.) E. W.

Pyridine Derivatives. C. BÖTTINGER.

The following compounds are described:

Picoline carbo-acid, crystallizes with one mol. of water of crystallization, which may be driven off at 100° C.

Pyridine carbo-acid, crystallizes with one mol. water of crystallization; has slightly basic properties; dissolves easily in sulphuric and hydrochloric acids.

Pyridine tricarbo-acid. Several salts of this acid are described. (*Ber. d. ch. Ges.* 1884. 92.) J. H. S., JR.

Pyridine Compounds obtained by Condensation. C. BÖTTINGER.

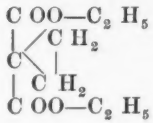
The author states that by treating an aqueous solution of imidopyrotartrate of ammonia with the fumes of bromine, he obtained uvitonic acid, which was recognized by the analysis of its silver salt. (*Ber. d. ch. Ges.* 1884. 53.) J. H. S., Jr.

On the Action of Ethylene Bromide on Malonic Acid Ether. W. H. PERKIN, JR. (*Ber. d. ch. Ges.* 1884. 54.)

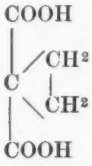
Trimethylendicarbo-acid Ether.

This was obtained from 30 grms. malonic acid ether, by treating it with 9 grms. sodium and 100 grms. absolute alcohol.

FORMULA.

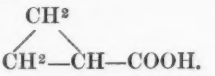


Trimethylendicarbo-acid.



Obtained from the ether by heating it with alcoholic potash.

Trimelthyenmonocarbo-acid.



Obtained from trimethylen-dicarbo-acid by heating it on the oil bath to 210°C. (*Ber. d. ch. Ges.* 1884. 54.) J. H. S., JR.

On Benzoylacetic Acid. ADOLPH BAEYER and W. H. PERKIN, JR.

The authors after a few preliminary remarks describe the following compounds:

Diethyl Ether of Dibenzoylsuccinic Acid.

Colorless, small prisms, melting point, 125–126°C.

Monolactone of Dibenzoylsuccinic Acid.

Small needles, with brownish color. Melting point 230°C. Sparingly soluble in water, but easily soluble in alcohol, ether and benzole.

Dilactone of Dibenzoylsuccinic Acid.

Colorless leaflets, with silver colored lustre. Melting point, 254–255°C. At this temperature it undergoes decomposition. (*Ber. d. ch. Ges.* 1884. 57.) J. H. S., Jr.

On the action of Chlor-and Bromacetone, Acetophenonebromide and Phenylbromacetic Acid on Acetacetic Ether. A. Weltner. (*Ber. d. ch. Ges.* 1884. 66.)

J. H. S., Jr.,

Nitriles and Carbo-Acids from Aromatic Amines. K. Gousiorowski & V. Merz.

The authors prepared benzonitrile by heating formanilide and zinc dust in a flask with return cooler. This was formed according to the following reaction:

$$C_6H_5-N\begin{matrix}COH\\ \diagdown\\ \diagup\\ H\end{matrix} + Zn = C_6H_5-N=C + ZnO + H_2$$

$$C_6H_5N=C=C_6H_5-C=N$$

From this benzoic acid was obtained.

Similar results are obtained from formoorthotoluide, only in this case the acid obtained from the nitrile corresponds to orthotoluylic acid. Melting point 102° C. (*Ber. d. ch. Ges.* 1884. 73.)

J. H. S., Jr.

On the Violet Derivatives of Triphenylmethane. O. Fisher and G. Köerner.

The authors describe a new synthesis of hexamethylparaleukaniline. 1 pt. ethyl ether of orthoformic acid, ¾ pts. dimethylaniline, and 2 pts. of zinc chloride are heated on the water bath. The melt is freed from excess of dimethylaniline by steam, dissolved in HCl, and poured into cold ammonium hydrate, which precipitates the base. After one crystallization it is perfectly pure; crystallizes in beautiful silvery leaflets. M. P. 172—173° C.

This compound is formed according to the following equation:

$$CH(O-C_2H_5)_2-O-C_2H_5+3C_6H_5N(CH_3)_2=CH=(C_6H_4N<\begin{matrix}CH_3\\CH_3\end{matrix})_3+3\,C_2H_5OH$$

(*Ber. d. ch. Ges.* 1884. 98.) J. H. S., Jr.

On a New Method of Producing Acridine. O. FISHER AND G. KÖERNER.

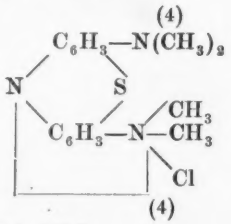
One pt. of chloroform, 1 pt. diphenylamine, and ½ pt. of zinc oxide are heated under pressure. The formation may be explained by the following reaction:

$$C_6H_5-NH-C_6H_5+CCl_3H+ZnO=C_{13}H_9N+ZnCl_2$$

(*Ber. d. ch. Ges.* 1884. 101.) J. H. S., Jr.

On Methylen Blue. RICHARD MÖHLHAU.

The author agrees with Bernthsen in giving methylen blue chloride the following formula:



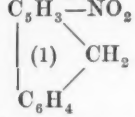
(*Ber. d. ch. Ges.* 1884. 102.) J. H. S., Jr.

On the Synthesis of Pyrocoll. G. L. CIAMICIAN and P. SILBER. (*Ber. d. ch. Ges.* 1884. 103.) J. H. S., Jr.

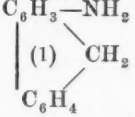
On Paraamidofluorene. JOS. STRASBURGER.

This compound was obtained by reducing paramononitrofluorene with tin and HCl.

p. Mononitrofluorene



p. Amidofluorene



Light brown colored needles melting at 124—125° C. (*Ber. d. ch. Ges.* 1884. 107.) J. H. S., Jr.

On a few Naphthaline Derivatives. Eug. Lellman. (*Ber. d. ch. Ges.* 1884. 109). J. H. S., Jr.

On Tetramethylbenzidine. W. Michler and H. Pattinson.

This compound was produced by heating dimethylaniline dissolved in sulphuric acid, and adding by degrees 3 mols. of lead peroxide. The platinum salt of this compound has the following formula:

$$\begin{matrix} C_6H_4N(CH_3)_2HCl \\ | \\ C_6H_4N(CH_3)_2HCl \end{matrix} + PtCl_4$$

A tetramethylbenzidine was also produced directly from benzidine by treating it with methyl iodide and methyl alcohol. (*Ber. d. ch. Ges.* 1884. 115.) J. H. S., Jr.

On the Preparation of Orthonitrobenzaldehyde. Alfred Einhorn.

The soda salt of orthonitrocinnamic acid is dissolved in water and oxidized with potassium permanganate. The mixture is shaken up with benzole during the whole process of oxidation, which removes the orthonitrobenzaldehyde the moment it is formed, and after the reaction is ended the nitrobenzaldehyde is obtained in a solid state by distilling off the benzole. Yield, 50–53%. (*Ber. d. ch. Ges.* 1884. 119.) J. H. S., Jr.

On Derivatives of Hydrindonaphthene. A. Baeyer and W. H. Perkin, Jr. (*Ber. d. ch. Ges.* 1884. 122.) J. H. S., Jr.

Researches on the Gums of the Arabin Group, Part I. Arabic Acid, its Composition and the Products of its Decomposition. C. O'Sullivan.

Gum arabic, ordinary Levantine gum, is stated to be a salt of arabic acid, with potash, lime or magnesia. The results of Mulder,

Neubauer, Scheibler and earlier investigators are conflicting, and leave the true composition undecided. The author separated the acid by the method of Neubauer in the main. Successive portions of the acid obtained by fractional precipitation were found to be practically identical in their action on polarized light, and in their precipitates with BaO, showing the acid to be a homogeneous body. The decomposition products of arabic acid by H_2SO_4 were then studied as affording a possible clue to its condition. These products, according to Schiebler, are a crystallined and a non-crystalline sugar, and an acid of which the Ba salt is insoluble in alcohol. The latter was first precipitated by the author, and after precipitation submitted to fractional decomposition by H_2SO_4, whereby it yielded two acids, the Ba salts, of which contained respectively 13.4%, corresponding to the formula $C_{29}H_{48}O_{27}$ BaO and 15% of BaO. The latter, by further action of H_2SO_4, gave a new salt requiring 18.68% BaO, and an uncrystallizable sugar of the $C_6H_{12}O_6$ class. The acid of the last salt agreed most closely with the formula $C_{23}H_{38}O_{22}BaO$, corresponding to a carbohydrate $-CH_2+O_2$. The relation between the salts of the two acids is indicated by the equation

$C_{29}H_{48}O_{27}BaO+H_2=C_{23}H_{38}O_{22}BaO+C_6H_{12}O_6$, and the three Ba salts differ from one another by the group $C_6H_{10}O_5$, which, in the decomposition of the salt, is hydrated to form a sugar of the $C_6H_{12}O_6$ class. The arabic acid molecule, in breaking down, yields with simultaneous hydration, a series of acids, each one differing from its neighbor by $C_6H_{12}O_6$.

Arabic acid has the formula $C_{89}H_{142}O_{74}$, and its Ba salt has 6.00% of BaO. The paper is devoted mainly to establishing the constitution of arabic acid. Four different sugars (α. β. & γ arabinose), resulting from separate stages of the decomposition of arabic acid are shown to exist and to be defined by their difference in rotation and copper-reducing properties. The different acids (α. β. & γ arabinosic acids) are partly defined, the details being left for a later investigation.

Arabic acid $[\alpha]=-27°$–$28°$ is the chief constituent of all laevorotatory Levantine, E. Indian, Senari and Senegal gums, but other acids are also present in these gums which the author believes to bear simple relations to arabic acid. Some high-rotating gums are believed to contain acids of large molecule, and to be related to arabic acid, as it is itself related to the arabinosic acids above mentioned. (*J. Ch. Soc.* CCLV., 41). A. A. B.

On the Preparation of Pure Chlorophyll. A. TSCHIRCH.

The belief in the comparative stability of chlorophyll, which has hitherto been held, is regarded by the author as an error and to be the source of failure in preparation of the pure substance. Previous attempts to separate it have been based upon the action of energetic chemical agents, by which chlorophyll itself has been destroyed. The crystalline chlorophyll of Gautier and Rogalski is found to be identical with the chlorophyllan of Hoppe-Seyler, and is a product of the oxidation of chlorophyll; also the pure chlorophyll of Berzelius, Mulder and Pfaundler is identical with Fremy's phyllocyanic acid. These two bodies agree perfectly in their absorbtion spectra, but are shown by their behavior with caustic alkalies to be totally distinct substances. Chlorophyll is decomposed by weak acids, even by the vegetable acids in leaf cells, which accounts for the spontaneous decomposition of chlorophyll tinctures as shown by the changing spectra. It is also decomposed during extraction from the leaf by solvents, through the same agency. Saponification of chlorophyll extracts is equally ineffective in securing the pure substance. The author defines pure chlorophyll as the substance which yields a spectrum identical with that of the living leaf, and obtains this substance through reduction of chlorophyllan in alcoholic solution of zinc dust on the water bath. The solution thus obtained is in the form of blackish-green drops, which have not yet been made to crystallize. It is soluble in alcohol, ether, benzene, fatty and volatile oils, sparingly soluble in fused paraffin, and insoluble in hot water. It is decomposed by concentrated and dilute acid and by caustic potash. The alcoholic solution is much less sensitive to light than ordinary chlorophyll tincture. The article concludes with a table of synonyms relating to bodies of the chlorophyll group. (*J. Ch. Soc.* CCLV., 57). A. A. B.

Preparation of Glyoxal. R. DE FORCRAND.

The product resulting from the action of nitric acid on aldehyde was taken up with a small amount of water, saturated with calcium carbonate and filtered, then precipitated with a slight excess of concentrated solution of bibasic lead acetate, filtered, exactly enough oxalic acid added to precipitate the lime, and evaporated on the water bath. The product is purified by drying in vacuo at a temperature not exceeding 110° to 120°. After this, however, it is not

absolutely pure. The yield amounts to about 18 per cent. of the amount of aldehyde used. (*Bul. Soc. Chim.*, XLI. 240). E. W.

Transformation of Glyoxal into Glycolic Acid. R. DE-FORCRAND.

Glyoxal prepared as above dissolves in alkalies forming glyco lates. The author gives an account of some thermochemical investigations on this reaction. (*Bul. Soc. Chim.*, XLI. 244). E. W.

On the Decomposition of Compounds Optically Inactive by Compensation. E. JUNGFLEISCH.

Ordinary, crystallized paratartrate of soda and ammonia contains two forms, a right and a left-handed salt, the solubilities of which have been considered practically the same. By making a supersaturated solution, and introducing simultaneously, in different places in the solution, a right-and left-handed crystal, the two salts were separated. As the right-handed crystals separated in larger proportion at first, the conclusion is that the right-handed salt is somewhat more insoluble. (*Bul. Soc. Chim.*, XLI. 222). E. W.

On the Decomposition of Silver Fulminate by HCl. E. DIVERS and M. KAWAKITA.

Formic acid and hydroxyammonium chloride were produced as in the case of the mercury salt, but only $\frac{2}{3}$ of the calculated quantities of these bodies were obtained. Ammonia and a trace of HCN were also obtained, but the authors have failed as yet to find what becomes of the rest of the carbon and nitrogen. The silver salt used contained 71.79% Ag. Theory requires 72%. (*J. Ch. Soc.* CCLV., 75). A. A. B.

Heat of Combustion of Some Ketones and of two Carbonic Acid Ethers. N. W. LONGUININE. P. C.

Diethylketone $C^2H^5 \diagdown CO \diagup C^2H^5$

Average of 3 experiments give 8569 heat-units for 1 gramme of substance burnt, or 736934 heat-units for 1 molecule.

Dipropylketone, $C^3H^7 \diagdown CO \diagup C^3H^7$

Average of 5 experiments, 9244.5 heat units for 1 gramme or 1053873 for 1 molecule.

Diisoprophylketone, $CH(CH^3)^2 CO$

Average of 4 experiments, 9172.4 heat-units for 1 gramme, 1045654 heat-units for 1 molecule.

Methylhexylketone, $\begin{matrix} CH^3 \\ C^6H^{13} \end{matrix}\!\!>\!CO$

Average of 3 experiments, 9467 heat-units for 1 gramme, 1211789 for 1 molecule.

Conclusions: The differences between the heats of combustion of dipropylic and diisopropylic ketones (1053873 and 1045654) = 8219 heat units or 0.8 of 1 p. c., which is within the limit of error for experiments of this nature.

The difference between the heat units of dipropylketone (1053873) and of diethylketone (736954) is 316969 for $2(CH^2)$, or 158484 heat units for CH^2. The difference between the heat of combustion of methylethylketone (1211789) and dipropylketone (105387) = 157916 for CH^2, very nearly the same result as above.

The author has also studied two ethers of carbonic acids:

Methylcarbonic ether, $\begin{matrix} CH^3O \\ CH^3O \end{matrix}\!\!>\!CO$

Average of 4 experiments, 3774.3 heat units for 1 gramme, and 339691 for 1 molecule.

Diethylcarbonic ether, $\begin{matrix} C^2H^5O \\ C^2H^5O \end{matrix}\!\!>\!CO$

Average of 5 experiments, 5442.8 heat units—for 1 molecule, 642250.

The difference of the heats of combustion of these two ethers is 302559 for 2 (CH^2), or 151280 for CH^2, which is a little less than was found by comparison of two ketones.

By comparing the combustion heats of diethylketone and of ethylcarbonic ether, we see that the introduction of 2 atoms of oxygen has given a diminution of 94684 heat units or 47342 for 1 oxygen atom. (*Comptes Rend.* XCVIII. 94.) P. C.

On Camphoric Peroxide and Camphorate of Barium. C. T. KINGZETT.

Brodie has stated (Phil. Trans. 1863, p. 407) that a barium

salt of camphoric peroxide is obtained by triturating camphoric anhydride with an equivalent of BaO_2 in ice-cold water. This statement is questioned by Kingzett who interprets the facts presented by Brodie in another way. Camphoric anhydride becomes camphoric acid in presence of water, and this acting on BaO_2 sets free H_2O_2 and forms barium camphorate. Experiment shows this hypothesis to be the true one.

The following reactions which are found to occur separately, will take place in succession under the conditions of Brodie's experiment, viz:

Camph. Anhydride. Camph. Acid.

(1) $C_{10}H_{14}O_3+H_2O=C_{10}H_{16}O_4$

(2) $BaO_2+C_{10}H_{16}O_4=C_{10}H_{14}BaO_4+H_2O_2$.

(*J. Ch. Soc.* CCLVI., 93). A. A. B.

On Strychnine. (First note.) M. HARRIOT.

The presence of brucine interferes with the bichromate test for strychnine. If the proportion of strychnine is large, the brucine can be first destroyed by nitric acid, when the strychnine reactions can be obtained. Many commercial samples of brucine no doubt contain strychnine, and the suggestion is made that possibly the toxic effects attributed to brucine, may be partly or entirely owing to such admixture of strychnine. In conjunction with M. Blarez, the author has noted that concentrated solutions of strychnine salts are precipitated by any acid, preferably by the acid already existing in the salt. The precipitate re-dissolves in an excess of the acid, and is re-precipitated by water, provided that too large an excess of acid has not been used.

The mode of preparation and properties of dinitrostrychnine and diamidostrychnine are described. (*Bul. Soc. Chim.*, XLI. 233). E. W.

Ferric Ethylate and Colloidal Ferric-hydrate—by M. ED. GRIMAUX.

By treating 1 molecule of ferric chloride, dissolved in absolute alcohol, with six molecules of sodium ethylate, a precipitate of Na Cl is obtained, and a reddish brown solution, which does not give the reaction of chlorine.

By distillation over a water bath a black, pasty mass is obtained which is soluble in absolute alcohol, benzine, chloroform, petroleum, and methylic alcohol.

The alcoholic solution is not precipitated by gaseous ammonia. If the alcoholic solution is left in contact with air, moisture is absorbed and a thick coagulum of ferric hydrate obtained. If a large quantity of water is added, a limpid liquid is obtained, presenting all the characters of Graham's solution of colloidal ferric hydrate. After a time the solution coagulates spontaneously. Heat coagulates it at once. The rest of the paper is taken up with a study of the conditions of coagulation, leading to the conclusion that mineral colloïds behave like nitrogeneous animal colloïds. (*Comptes Rend.* XCVIII. 105.) P. C.

On the Occurrence of a Phenol in the Stem and Leaves of Pinus Sylvestris. A. B. GRIFFITHS.

Phenol is identified in a hot-water extract of the materials by means of ferric chloride and bromine water, and by the coagulation of albumen. (*Chem. News*, XLIX, 95). A. A. B.

Remarks on the Chemistry of Plants. M. BALLO. (*Ber. d. ch. Ges.* 1884. 6.) J. H. S., Jr.

Action of Solutions of Cellulose in Schweitzer's Reagent on Polarized Light. A. LEVALLOIS.

The plane of polarization is strongly turned to the left, but this deviation is not proportional to the degree of concentration of the solution. The celluloses were from linen, cotton Berzelius paper and German filtering paper. (*Comptes Rend.* XCVIII. 44.) P. C.

On the Action of Hydrocarbons of the Acetylene Group, on Oxide of Mercury and its Salts. M. KUTSCHEROFF.

If allylene, at the ordinary temperature, be passed through a solution of corrosive sublimate, the latter soon becomes turbid, and after a while deposits a copious, white, crystalline precipitate. During this reaction HCl is evolved, which may be easily recognized by means of litmus paper. On analysis, the purified precipitate gave figures which lead to the following formula:

$$3\,HgCl_2.\ 3\,HgO.\ 2\,C_3H_4.$$

The precipitate is insoluble in water and cold alcohol, but is easily soluble in hydrochloric and acetic acid, undergoing decomposition and splitting up into the corresponding mercury salt and acetone.

The process may be explained by the following reactions:

(1) $6\ HgCl_2 + 3\ H_2O + 2\ C_3H_4 = 3\ HgCl_2.\ 3\ HgO.\ 2\ C_3H_4 + 6\ HCl.$

(2) $3\ HgCl_2.\ 3\ HgO.\ 2\ C_3H_4 + 6\ HCl = 6\ HgCl_2 + 2\ C_3H_6O + H_2O.$

These two reactions can, according to circumstances, be made to take place separately or together, as may be desired. Mercuric bromide seems also to react on allylene, while, on the other hand, mercuric iodide does not. After experiments, the author concludes:

1. That allylene reacts with all mercuric salts, but that the products obtained differ from one another, according as the reactions took place in acid or alkaline solutions.

2. The hydration of allylene by means of mercuric salts is characteristic of the general reaction of this hydrocarbon with mercuric salts in acid solutions. In this case, also, complex mercuro-acetone compounds are formed, but are decomposed the moment they are formed, with liberation of acetone.

3. The structure of ketones, in relation to that of the hydrocarbons, which are derived from the latter by means of mercuric salts, may be determined according to the following rule:

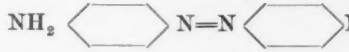
In unsymmetrical hydrocarbons, the hydrogen of the molecule of water we wish to bind, unites with that carbon atom which is held by three bonds, or which is hydrogenized; the oxygen, on the other hand, unites with the non-hydrogenized carbon atom.

In symmetrical hydrocarbons, on the contrary, the elements of water divide themselves evenly on both sides of the triple bond. (*Ber. d. ch. Ges.* 1884. 13.) J. H. S., Jr.

Researches on Secondary and Tertiary Azo-Compounds. R. MELDOLA.

By the action of diazoparanitrobenzene upon a solution of dimethylamine hydrochloride, the author obtained paranitrobenzineazodimethylamine hydrochloride. The properties of the free base and of the corresponding amido-base are described. The latter furnishes an exceedingly delicate test for nitrous acid, preferable in some respects to the test with metaphenylenediamine.

The constitution of the base may be written



The remainder of the paper is devoted to a study of the action of diazotized metanitraniline upon primary, secondary and tertiary monamines. (*J. Ch. Soc.* CCLVI., 106). A. A. B.

Studies on the Hydrocarbons and Higher Alcohols Obtained from American Petroleum. G. LEMOINE.

A detailed report of the results of experiments on octylic, nonylic and decylic compounds, confirmatory of those of MM. Pelouze and Cahours. (*Bul. Soc. Chim.* XLI. 161.) E. W.

Russian Chemical Society. Correspondence of M. O. DAVIDOFF.

M. Gustavson, by treating the volatile portions of petroleum with bromine in the presence of aluminum bromide obtained crystalline bromine derivatives C_6Br_6 and C_6Br_5, CH_3.

The process permits the detection of aromatic compounds in the presence of large amounts of paraffins.

M. Sabaneéff describes some combinations of acelytene, vinyl and ethylene.

M. Lwoff gives the results of researches on the action of chlorine on isobulytene. Isobulytene chloride was not detected among the products of the reaction.

M. Danilewski gave the result of examination of albuminoid substances. Myosine is a basic substance. Myosines from different sources have different powers of saturation. They all contain small amounts of calcium, magnesium and phosphoric acid. These may be removed by neutral acids, but the myosine is then transformed into syntonine. Myosine and syntonine have a rotatory power which may be destroyed by the prolonged action of a 1 per cent. solution of HCl. Mysostroine, a weak base, was also found in muscular tissue.

Caseine was found to be a combination of nucleine with protalbumen. The products of decomposition of albumenoid substances were also studied. E. W.

M. Ritza gave an account of the properties of the camphor extracted from Lechum palustre. White crystalline solid fusing at 104° to 105°, boiling at 202°. Observed vapor density 8.1. Formula $C_{15}H_{24}O$, or $C_{16}H_{26}O$.

M. Lidoff presented a note on the solubility of aniline in solutions of its salts. A concentrated aqueous solution of the chlorhydrate will dissolve aniline in all proportions.

MM. Lidoff and *Loukianoff* gave a method for the determination of glycerine in alizarine oil.

M. Pelopidas communicated an application of the principles of the periodic system to organic substances. (*Bul. Soc. Chim.*, XLI. 253). E. W.

ANALYTICAL CHEMISTRY.

On the Conversion of Hyposulphites, into Sulphates, by means of Potassium Permanganate. G. BRUGELMANN.

A concentrated solution of potassium permanganate is added to the boiling solution of hyposulphites under examination, until it has assumed a distinct violet color. The excess of permanganate is then decomposed by adding alcohol and the precipitate of $Mn_2 O_3$ is filtered and washed with hot water. The filtrate is heated till all the alcohol has been expelled.

Sodium hyposulphite, on being heated with potassium permanganate, splits up according to the following reaction:

$2\ KMn\ O_4 + Na_2\ S_2\ O_3 = K_2\ SO_4 + Na_2\ SO_4 + Mn_2\ O_3$. The sulphuric acid is then estimated as $Ba\ SO_4$. (*Fres. Zeit.* 1884. 41.)

J. H. S., JR.

Remarks on Azotometry. CARL MOHR.

After some remarks the author proceeds as follows:

If an ammonia salt is to be examined, a two per cent. solution of it is made, if on the contrary a fertilizer is to be examined, 5 or 10 g. are taken, and the solution is made up to 100 c. c.

10 c. c. of this solution are allowed to flow into a 150 c. c. flask, containing 50 c. c. of a solution of bromine in sodium hydrate. The evolution of gas follows quietly, without producing much heat, and the results are said to be quite accurate. (*Fres. Zeit.* 1884. 26.)

J. H. S., JR.

On the Estimation of Nitrogen. DR. RUBE.

The author states that he has made about 3,000 nitrogen determinations, using Ruffle's method, and always obtained good results. He attributes the failures reported by others in using this method to improper application of it. (*Fres. Zeit.* 1884. 43.) J. H. S., JR.

Apparatus for Reducing Measured Volumes of Gas to Normal Conditions. U. KREUSLER. (*Ber. d. ch. Ges.* 1884. 29.) J. H. S., Jr.

Contributions to the Development of the Sprengel Air Pump. C. H. GIMINGHAM.

Perfection in the instrument is only to be attained by a careful regulation of diameter and length of fall tubes employed. The length of the fall tube should be about 39 inches. The most satisfactory results as to amount of mercury used were obtained by a fall tube of 1.8 m.m. diameter, the mercury running at the rate of 100 c.c. in five minutes. For measurement of the vacuum produced, the McLeod guage (Phil. Mag. May, 1874) is used. (*J. Soc. Ch. Ind.* III. 2. 88.) E. W.

An Improved form of Orsat's Apparatus for Estimation of Oxygen. J. B. C. KERSHAW.

The author calls attention to an error incident to the ordinary form of the apparatus, depending upon the difference of level of the absorbing liquid within and without the vessel, and suggests a modification of the apparatus to correct it. (*Chem. News*, XLIX, 73). A. A. B.

On the Alkaline Reaction of Glass, as an Error, in Analysis. By U. KREUSLER and O. HENZOLD.

A number of interesting experiments were here made, which clearly prove that water reacts on the various kinds of glass with more or less energy, dissolving enough, in some cases, to produce errors in analysis. (*Ber. d. ch. Ges.* 1884. 34.) J. H. S., Jr.

Analysis of Pure Wines. R. FRESENIUS and E. BORGMANN. (*Fres. Zeit.* 1884. 44.) J. H. S., JR.

On the Estimation of Tartaric Acid in Wine. R. KAYSER.

A statement of some of the errors involved in the estimation of tartaric acid in wines by titration. (*Fres. Zeit.* 1884. 28.) J. H. S., JR.

On the Quantitative Spectroscopic Examination of Different Samples of Pure Indigo. C. H. WOLFF. (*Fres. Zeit.* 1884. 29.) J. H. S., JR.

The Hygrometer in the Desiccator. DR. E. FLEISCHER.

The author finds that calcium chloride is not as good an absorbent of moisture as has been supposed, and also finds from hygrometric experiments that sulphuric acid will not only absorb more moisture, but will do so four times as rapidly as calcium chloride. (*Fres. Zeit.* 1884. 33.) J. H. S., JR.

On Some Improvements in the Estimation of Tannins. H. R. PROCTOR.

The principal modification (Loewenthal's method) consists in the addition of a small amount of pure kaolin to the solution containing the tannate of gelatine in suspension, with vigorous agitation. Thus treated, the precipitate filters readily without necessity for tedious waiting. The author prefers to express the percentage of tannic acid in terms of oxalic acid.

Oser's number for quercitannic acid (62.36) is not very far from the molecular weight of oxalic acid (63), and he considers it preferable to employ a standard which may be readily verified. (*J. Soc. Ch. Ind.* III. 2. 82.) E. W.

On the Existence of Phosphoric Acid in Ammonium Molybdate. M. RUPFFERSCHLAGER.

It is noted that phosphoric acid has not been recognized as a constituent of any of the molybdenum minerals except in one case.

The yellow precipitate which frequently forms in the molybdate reagent is not the phospho-compound.

The reagent as usually made is too highly concentrated. The formula given by Fresenius is considered satisfactory. (*Bul. Soc. Chim.* XLI. 172.) E. W.

On a New Qualitative Method of Separating Tin, Antimony and Arsenic. By EMIL BERGLUND.

This process is based upon the fact that the sulphides of tin, antimony and arsenic, on being boiled with oxide of copper in an alkaline solution, lose their sulphur and pass over into the corresponding oxygen-compounds. Thus stannic sulphide in caustic soda solution is oxidized to stannic oxide.

In a similar manner antimony trisulphide and arsenic trisulphide are oxidized respectively to antimonic and arsenic acids.

(*Ber. d. ch. Ges.* 1884. 95.) J. H. S., Jr.

An Alcohol Lamp with Constant Level. C. REINHARDT. (*Fres. Zeit.* 1884. 40.) J. H. S., JR.

On the Numbering of Porcelain Crucibles. C. REINHARDT.

The author numbers the crucibles with a mixture composed of silica, litharge, boracic acid and some metallic oxide, as chromic oxide, etc., which are finely ground in an agate mortar with a little aniseed or lavender oil. The crucibles, after being painted with this mixture, are gradually heated in a muffle until the color has completely burned in. (*Fres. Zeit.* 1884. 42.) J. H. S. JR.

Note on the Stability of Hypobromite Solution, and its Use for the Titration of Oils, etc. A. H. ALLEN.

The results of experiments by boiling or keeping the solution of bromine in caustic soda are given in detail. The conclusions are: 1. The presence of excess of caustic soda greatly increases the stability of hypobromite solutions. 2. Most solutions of brominated soda lose a little of their available bromine by boiling. 3. The solution of bromine in excess of caustic soda solution has, after boiling, all the practical advantages which would be possessed by a concentrated solution of free bromine, not liable to loss by volatilization or change in strength by keeping.

The reaction on first dissolving the bromine is:

$$2\,NaHO + Br_2 = NaBrO + NaBr + H_2O.$$

If the solution is boiled, or is kept some time the following reaction occurs: $3\,NaBrO + 3\,NaBr = NaBrO_3 + 5\,NaBr$.

The action of HCl on the first solution would be:

$$3\,NaBrO + 3\,NaBr + 6\,HCl = 6\,NaCl + 6\,Br + 3\,H_2O.$$

If the transformation into bromate has proceeded with more or less completeness, there is no theoretical loss of available bromine, the reaction being

$$NaBrO_3 + 5\,NaBr + 6\,HCl = 6\,NaCl + 6\,Br + 3H_2O.$$

A peculiar fact was observed, viz., that the bromine found in the brominated soda by titration was always slightly in excess of the proportion actually used by weight. In the discussion it was suggested that a new determination of the atomic weight of bromine was desirable. (*J. Soc. Ch. Ind.* III. 2. 65.) E. W.

Determination of Fat Acids in Oils. Ch. E. Schmitt.

Fermentation in oils causes fat acids to separate from glycerine. This is notably the case with oleic acid. Fat acids are not objectionable for soap making or wool cleaning, but they are very much so for machinery, as they act on metals in the same manner as mineral acids, although less violently.

The only process now used is that of Burstyn. It is based on the property possessed by strong alcohol of dissolving fat acids, while neutral fats are not perceptibly soluble.

The operation consists in shaking up 100 grammes of the oil with 100 grammes of alcohol 95%. The shaking should be energetic and often repeated. After settling for some hours, the alcohol, with the fat acids in solution rises to the top. This alcohol is separated; 20 c.c. are taken with a pipette and tested by a standard alkaline liquid. The acid obtained corresponds to sulphuric acid. This is multiplied by 5, which gives the quantity of oleic acid, as this acid generally predominates.

A controversy having arisen about oil purchased by a house in Lille, the author was led to examine Burstynn's process.

A volume of the alcoholic solution of fat acids equal to 20 c.c. was evaporated in a stove at 100° to 105° C, until the weight becomes constant. The following oils were examined:

	Burstyn's Process.	By Weight.
Sweet Almond Oil	0.37	0.28
Pure Olive "	0.514	0.600
Acid Olive "	6.83	6.
" " "	9.23	10.15
" " "	12.70	13.
French Rape Seed Oil	0.85 to 0.90	0.65 to 90
Bombay " " "	0.75	0.25
Dunkirk Codfish "	0.677	0.422

The process of Burstyn gives results which may be considered satisfactory. Alcohol dissolves volatile acids which are lost by evaporation, and also coloring and odorous substances which have no action on an alkaline solution. The influence of volatile substances is to give gravimetric results lower than those by Burstyn's process, while coloring and odorous substances tend to give higher results as they have no action on the standard alkaline solution.

Turmeric gives better indications with fat acids than either litmus or phenolphthalein. (*Mon. Scientifique.* 3. XIV. 205.)

P. C.

The Separation of Benzine, Toluene and Xylene from Crude Gas Tar, Naphtha and Crude Gas Benzines. J. VON HOHENHAUSEN.

The method for testing the crude product is given as follows: In a flask of 500 c.c. capacity fitted with a stopper carrying both a stop-cock funnel and a safety tube, are placed 100 c.c. of the benzine to be tested, and a cold mixture of 150 gms. nitric acid (80° Tw), and 200 gms. sulphuric acid (170° Tw), are gradually added, the temperature of the mixture being kept down by using cold water on the outside, and regulating the addition of the acids. Constant shaking is necessary to insure the reaction, and this must be kept up after adding all the acid until the contents of the flask are cold. After separating the acid and washing with dilute caustic soda, and finally with water, the amount of nitrobenzine obtained is determined.

This product may be further tested as follows: 100 c.c. are placed in a retort, and after distilling off about 98 per cent., the residue should still be liquid. The first 30 c.c. distilling over is treated with 70 c.c. of sulphuric acid (of 170° Tw), when all the nitrobenzine dissolves, and the non-nitrated hydrocarbons will separate. These should be again treated with the nitro-sulphuric acid mixture, when there is a rise in temperature, if any benzine remains. After all the benzine has been converted into the nitro-compound, the hydrocarbons undissolved by concentrated sulphuric acid may be separated and determined.

The different forms of apparatus (Vedle's toluene apparatus, Egrot's system and Vedle's system) for the refining of commercial benzine are described, the description being illustrated by cuts. (*J. Soc. Ch. Ind.* III. 2. 73.) E. W.

On the Quantitative Determination of Ortho-Meta-and Paraxylene. I. LEVINSTEIN.

The boiling points of these hydro-carbons are:

Orthoxylene	141° – 142°c.
Metaxylene	140° – 141°c.
Paraxylene	136° – 137°c.

Fractional distillation cannot be used to separate these.

The metaxylene is the only one possessing at present any technical value.

A. *To Determine Metaxylene.*—Take 100 cc of the crude sample, heat at 100°C with 40 c.c. nitric acid (80° Tw), and60 c. c. water, for half an hour, or until red fumes are no longer evolved, keeping the mass well mixed. Separate the hydrocarbons from the acid, add excess of caustic soda, and distill with wet steam. The hydrocarbons distilling over consist of metaxylene and some of the paraffines. On separating these hydrocarbons from the water, and mixing with about 1½ times their volume of concentrated sulphuric acid, the metaxylene dissolves by stirring for about half an hour, leaving the paraffines. Measurement of the amount of hydrocarbons before and after the sulphuric acid treatment gives the proportion of metaxylene. The nitric acid treatment, converts the ortho- and paraxylene into compounds soluble in caustic soda, while the metaxylene is unaffected.

A liberal washing with caustic soda may be substituted for the distillation.

B. *To Determine Paraxylene.*—Treat 100 c.c. of the crude xylene with 120 c.c. sulphuric acid (of 170° Tw), and mix for about half an hour. Paraxylene and paraffines remain undissolved. Separate and measure these. Dissolve out the paraxylene by addition of an equal volume of fuming sulphuric acid, and heating on the water bath for a short time. Separate and measure the paraffines and determine the paraxylene by difference as before. Pure paraxylene may be obtained from this mixture with the paraffines by distilling with wet steam. The first portions coming over contain the paraxylene ; distill these again with dry heat, collecting all that comes over up to 138°C; crystallize out by a freezing mixture, and press the crystals between filter paper.

C. *To Determine Orthoxylene.*—The amount may be estimated approximately by deducting from 100 the sum of the percentages of paraffines and meta- and paraxylene.

For a closer determination convert the ortho and metaxylene-sulphuric acids obtained in B into their calcium, and afterwards into their sodium salts. Concentrate the solution of the latter until the large prisms of ortho-salt begin to crystallize out. Allow to cool and separate a second crop of crystals by further concentra-

tion; redissolve and recrystallize the products. The distinction between the crystals of the ortho and of the meta-salt is easily perceived. The ortho- salt has the composition:

$$C_6 H_3 (CH_3)_2 . SO_3 Na + 5 H_2O.$$

In determinations of boiling points the thermometer was immersed in the liquid, the bulb being about half an inch from the bottom of the retort. (*J. Soc. Ch. Ind.* III. 2. 77.) E. W.

INDUSTRIAL CHEMISTRY.

On the Disposal of Sewage Sludge. C. C. HUTCHINSON.

By "sewage sludge" is meant the slimy mud deposited or depositable from sewage, the solids consisting in large proportion of organic matters containing 90 to 95 per cent. of water. The method described by the author consists in filtration of the sludge by filter presses of special construction. The press cakes thus obtained still contain about 50 per cent. of water, are inodorous, easily handled, and dry rapidly down to about 20 per cent. of water. A mixture of equal parts of aluminium and calcium sulphates is used as a precipitant before filtering the sludge. The press cake is fully equal to farm yard manure as a fertilizer. At Coventry, where a plant such as is described has been in operation for 2½ years, the cost is sixpence per ton of wet sludge, or half a crown per ton of pressed cake. The air-dried pressed cake is sold at from two shillings to three and sixpence per ton. The place contains a population of about 45,000, and 476 tons of wet sludge are treated daily.

In reply to a question the author stated that about five-sixths of the nitrogenous matter in the sewage passed away in the effluent, while about one-sixth remained in the sludge.

The press cake (50 per cent. water) contained 0.84 per cent. ammonia, and 1.81 per cent. phosphate of lime. (*J. Soc. Ch. Ind.* III. 2. 41.) E. W

The Porter-Clark Process. J. H. PORTER.

Description, with illustration, of the plant for this method of softening water. Lime water is mixed with the water to be softened and the mixture is passed through filter presses. At the London and Northwestern Railway locomotive sheds at Camden 7,000 gallons

of water are treated per hour, the hardness being reduced from 17° or 18° to 4°. Other results are quoted where the hardness is reduced from over 20° to 4° or less. (*J. Soc. Ch. Ind.* III. 2. 51.)
E. W.

Note on the Printing of Natural Indigo on Calico. R. BOURCART.

Description of the plant, with plans and illustrations, and of the processes used by Messrs. Schlieper & Baum, of Elberfeld. The process depends upon the reducing action of glucose, in presence of alkalies, at 100°C upon indigo. The color, which is made very thick for printing, is a mixture of indigo paste, caustic soda, and of mixed roasted and unroasted Indian corn-starch. The cloth is previously padded in a solution of glucose, and dried, the color is printed on, and the goods are then steamed, which causes the soda to dissolve, and brings the indigo in contact with the glucose. After thorough washing, the goods are dried and oxidized at the same time, and finally brightened by boiling with a weak solution of caustic soda, which is more satisfactory than a soap bath. Specimens are inserted in the text, showing the results with "printed indigo." "indigo printing on turkey red cloth," "indigo and sulphur resist," "white and yellow resist with indigo," "white and red mordant resist," and "half resist." The use of artificial indigo is not favored by the author, on account of the unpleasant odor of the sodium xanthate used, which is persistently retained by the goods. (*J. Soc. Ch. Ind.* III. 2. 55.) E. W.

Influence of Plaster of Paris on the Composition and Chemical Characters of Wine. M. MAGNIER DE LA SOURCE.

Ten kilogrammes of grapes were divided into two equal portions. One portion was allowed to ferment without the addition of any foreign body, while the other portion had 100 grammes of sulphate of lime added. The fermentation of both were finished in twenty days.

These two wines differed by their chemical characters, as shown by their reactions with borax, basic lead acetate, and aluminium acetate.

The color of the natural wine was yellowish, while the plastered wine was of a pure, bright red. Cream of tartar was present in the natural wine (nearly 2 %) but there was none in the plastered wine. (*Comptes Rend.* XCVIII. 110.) P. C.

Presence of Diamonds in a Pegmatite from Hindustan. M. CHAPER.

In Griqualand diamonds are found in a rock but it is doubtful whether this consolidated, serpentinous mud is the bed-rock of diamonds. At any rate, diamonds are not found in their bed-rocks either in India or in Brazil.

The author has had the good fortune to find diamonds associated with corundum in a pink pegmatite from the Naizam, in the neighborhood of Bellary, presidency of Madras.

The diamonds are in octahedra. (*Comptes Rend.* XCVIII. 113.)

P. C.

On the Influence of the Temperature of Distillation on the Composition of Coal Gas. L. T. WRIGHT.

An account of experiments with a small gas-making apparatus, in which, with all parts complete as in actual work, a charge of only $\frac{1}{1000}$ of a ton was used.

The influence of increasing temperature is shown by a series of analyses representing the composition of the gas made from four charges, each worked at a different temperature, the temperatures ranging from dull red to bright orange heat. Volume of product increases with temperature, and illuminating power decreases, although there is a slight increase in total candle power per ton of coal with increasing temperature.

H and CO increase with temperature, CH_4 and other hydrocarbons decrease, while N is nearly constant at all temperatures. The effect of increased duration of heating is similar to that of increased temperature. (*J. Ch. Soc.* CCLVI. 99). A. A. B.

Gaseous Fuel Applied to the Heating of Gas Retorts. C. HUNT.

Descriptions are given of different systems for regenerative heating of retorts. Regeneration without recuperation (heating of the air) cannot be made satisfactory. Uniformity of temperature throughout the setting is an important point. In recuperation, the use of the thinnest material, consistent with strength and durability, and long contact both for air and waste heat, must be secured. As to forms of producers, there is a great difference of opinion. For economy and convenience the generator should form a part of the

construction of the setting. The saving in fuel effected by the systems now available amounts to between 20 and 40 per cent. and upward. The question of the value of by-products is, however, one which has to be considered by gas companies in considering the question of the adoption of the regenerator system. The intensity of heat obtained by some systems has caused trouble in the clogging of the stand pipes or the hydraulic main.

It is suggested that the production of gas for distribution as fuel at cheap rates may be much nearer realization than is suspected by many. (*J. Soc. Ch. Ind.* III. 2. 89.) E. W.

Coal Gas as a Labor-saving Agent in Trade. F. FLETCHER.

A lecture delivered before the Society of Arts, Jan. 30, 1884, in which an extended description is given of new forms of burners and new applications of gas for heating purposes. (*Chem. News*, XLIX, 74). A. A. B.

An Attempt to Utilize Waste Heat by Perkin's Pipes. F. HURTER.

The attempt in the case described resulted in failure, although seems probable that with some modifications in the system adopted, success might be attained. (*J. Soc. Ch. Ind.* III. 2. 67.) E. W.

On Lilienfein's Lamp, for Low Boiling Petroleum. DR. UNECH. (*Fres. Zeit.* 1884. 35.) J. H. S. JR.

Abstracts of American Patents relating to Chemistry.

BY O. H. KRAUSE.

January 22, 1884.

292,236.—Process of mixing and consuming hydrocarbons with pulverized earth.—J. Leede.

292,237.—Apparatus for feeding and consuming fine fuel.

The hydrocarbons are mixed with granular material or pulverulent fuel and the mixture blown into a furnace and burned while in suspension.

292,260.—Utilizing waste calcium chloride and sulphate produced in the manufacture of acetic acid from acetate of lime.—C. Semper. Not intelligible without the specification.

292,269.—Composition for sizing yarn. J. W. Wattles (see also Nos. 186,435 and 172,216). A sizing or dressing composed of acetic acid, starch and grease or oil.

292,341.—Purification of coal gas.—J. T. McDougall. Impregnates sawdust, tanners' waste or other light material with a soluble salt of iron, decomposes the salt by an alkaline reagent whereby oxide of iron is deposited in the pores of the material which can then be used for the purpose stated above.

292,394 and 292,395.—Gas producers.—J. Zellweger.

292,417.—Apparatus for refining asphaltum for paving.—E. J. De Smedt.

The fumes and gases evolved from the heated asphaltum contained in covered melting kettles are withdrawn by means of an ejector and burned under a steam boiler.

January 29, 1884.

292,470.—Fertilizer.—D. R. Castleman. Ground tobacco stems and ordinary phosphates.

292,515.—Photometer.—T. O'C. Sloane.

Claim 2.—In an apparatus for determining the illuminating power of gas, a differential thermometer constructed as described, and balanced and arranged so as to indicate changes in the relative quantity of radiant heat developed by a flame of gas, and transmit such changes to a recording mechanism substantially as shown and described.

292,540.—Process of tinning sheet copper.—A. A. Cowles.

Protects side not intended to be tinned with silicate of soda.

292,605.—Art of extracting gold by means of alkaline sulphides.—C. P. Williams.

Heats the gold bearing material with carbon and an alkaline sulphate, leaches the cooled mass with water to dissolve out the sulphides from which the gold is recovered by precipitation.

292,622.—Apparatus for producing gas.—G. W. Billings.

292,669.—Process of solidifying liquid or semi-liquid fatty acids.—W. F. C. McCarty.

Improvements on Nos. 282,547 and 283,003. Obtains a product of high melting point by successively treating liquid or semi-liquid fatty acids with steam, air, nitric acid, starch, alkalies and sulphuric acid. The mixture is continuously agitated and heated and cooled at different stages of the process. The product is finally distilled in a vacuum.

292,696.—Apparatus for the manufacture of carbon black.—G. G. Shoemaker.

Liquid fuel is burned under rotating hollow cones kept cool by means of water distributed over their outer side.

292,753.—Process of making spongy lead for the manufacture of white lead.—J. K. Kessler. Passes an electric current, by means of a lead anode, through a solution of an alkaline acetate.

February 3, 1884.

292,788.—Apparatus for deoxidizing iron ores.—J. Bridgford.

292,891.—Process of treating fibrous rubber waste.—A. O. Bourn.

The cotton fibre is destroyed by boiling the chopped waste in a 3 or 4 per cent. solution of sulphuric acid.

292,944.—Desulphurizing furnace.—H. E. Parson and G. V. Northey.

292,980.—Soap.—C. F. Broadbent.

Consists of ordinary soap, water, hyposulphite of soda, borax and ammonia.

293,002.—Roasting furnace.—N. A. Foss and J. M. Gray.

293,010.—Building compound.—L. Haas. Furnace slag and mortar combined in suitable proportions with an additional cementing mortar made of powdered flint, sodium silicate, sand and clay.

293,023.—Coking furnace.—A. R. Hiltawski.

293,045.—Mixed Paint.—H. Little. Coal tar thinned by a light oil and wood ashes.

293,107.—Gas-retort furnace.—I. N. Stanley.

293,157.—Process of roasting and amalgamating gold and silver ores.—E. O. and C. Francke.

Consists in salting and roasting the same at a low temperature for conversion of certain sulphides into sulphates without disturbing other metallic salts, and afterward treating the same in a pulp with common salt and quicksilver, under the influence of heat and in the presence of metallic copper, whereby, through a series of reactions, the silver is reduced to a metallic state and amalgamated.

293,207.—Artificial stone.—R. C. Wittmann.—Carbonate or silicate of magnesia, carbonate of lime and muriatic acid, applied to pasteboard, wood, muslin, etc., and pressed.

February 12, 1884.

293,335.—Vacuum press percolator.—C. R. Knapp.

293,344.—Process of extracting glycerine from fatty matters.—E. F. and E. N. Michaud. Consists in placing the fatty matters, with water and a zinc preparation (known as "zinc-powder" and consisting, principally of finely divided metallic zinc and zinc oxide), and in the absence of calcareous or alkaline substances, in a closed vessel, subjecting the same to steam pressure for a sufficient time, and separating the water containing the glycerine from the resulting fatty acids.

293,376.—Process and apparatus for bleaching vegetable fibres, threads and fabrics.—J. B. Thompson.

First boil them in a solution of potassium or sodium cyanide, then subject them to alternate baths of a solution of chloride of lime and of carbonic acid gas in a closed vessel, and lastly passes them through a solution of triethylrosaniline and oxalic acid.

293,409.—Defacating saccharine liquids.—G. B. Boomer.

A train of vessels closed at the top and provided with heating mediums and so connected with adjustable overflow spouts that the clear liquid can be withdrawn from a point below the scum at the top and the sediment at the bottom.

293,430.—Apparatus for revivifying boneblack.—E. P. Eastwick.

The coolers under the kiln are surrounded by a casing for the purpose of confining a current of air. The heated air thereby obtained is forced by means of a blower through the wet boneblack contained in the drier placed over the kiln.

293,560.—Hydrocarbon furnace.—W. H. Brooks.

February 19, 1884.

293,740.—Method of purifying water.—I. S. Hyatt.

Consists in introducing into the water simultaneously with its passage to or into the filter, a substance (see next patent) which will sufficiently coagulate or separate the impurities to facilitate their arrest and removal by the filter bed, thus obviating the necessity of employing settling basins.

293,741.—Filtering material.—I. S. Hyatt.

Claim.—A filter bed, consisting essentially of an inert material and metallic iron in comminuted form thoroughly commingled.

293,742 to 293,750 and 293,882-883.—Filters and art of filtration.—J. W. Hyatt.

Various substances employed in different ways are claimed for mechanically retaining the impurities contained in water. Also arrangements to prevent clogging and to remove the deposited impurities without disconnecting the apparatus.

293,782.—Apparatus for evaporating and clarifying syrups.—D. D. Powers.

Consists in passing streams or jets of heated and ordinary air alternately through the material.

293,827.—Alloy and process for the manufacture of silicious copper and silicious bronze.—L. Weiller.

Claim 1.—Sodium bronze as a new combination of matter.

Claim 4.—In the manufacture of silicious bronze, the improvement consisting in adding tin and sodium together with potassium fluosilicate to the melted copper or bronze.

293,838.—Process and apparatus for extracting crystallized sugar from bagasse.—T. B. Yale.

Consists in subjecting the crushed saccharine material in a closed vessel to the action of steam, and then extracting the juice and dissolved crystallized sugar from the saccharine material by means of a vacuum.

293,854.—Apparatus for the manufacture of illuminating gas.—W. H. Douglass.

A hydrocarbon gas generator.

293,884.—Condenser-scrubber for gas.—C. W. Isbell.

Causes both the gas and the scrubbing liquor to pass in contact with artificially cooled surfaces.

293,886.—Alloy for coating metals.—J. B. Jones.

Consists of lead, tin and zinc, with metallic sodium added.

293,909.—Process and apparatus for preparing beer and other fermented liquids for the market.—C. Pfaundler. Consists in holding such beer or other liquid during fermentation under a controllable hydrostatic pressure and carrying off the barm which rises from the fermenting mass by a current of liquid.

293,936.—Amalgamator.—T. H. Becker.

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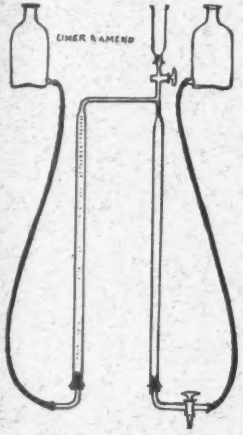

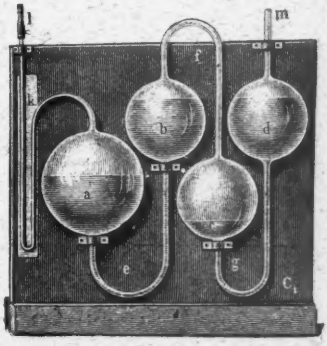

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